S. Hrg. 99-910

THE NEW CLEAN AIR ACT

HEARINGS

BEFORE THE

COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS UNITED STATES SENATE

NINETY-NINTH CONGRESS

SECOND SESSION

ON

S. 2203

A BILL TO ESTABLISH A PROGRAM TO REDUCE ACID DEPOSITION, AND FOR OTHER PURPOSES

SEPTEMBER 25, 26, 30; AND OCTOBER 2, 1986

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THE NEW CLEAN AIR ACT

THURSDAY, SEPTEMBER 25, 1986

U.S. SENATE,
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS,
Washington, DC.

The committee met, pursuant to notice, at 10:06 a.m., in room 406, Dirksen Senate Office Building, Hon. Robert T. Stafford (chairman of the committee) presiding.

Present: Senators Stafford, Chafee, Burdick, Mitchell, Baucus, and Lautenberg.

OPENING STATEMENT OF HON. ROBERT T. STAFFORD, U.S. SENATOR FROM THE STATE OF VERMONT

Senator STAFFORD. The committee will come to order.

Good morning, and welcome to this hearing on the subject of acid rain

The Senate is now in session, as it was until last evening and every other night this week. In view of the press of Senate business, I considered making no opening statement, but that is too much to expect of any committee chairman. So, instead I will make a brief one with one or two observations.

This is a familiar set of witnesses. The individuals or their organizations have testified before this committee many times. Not only are the people familiar, but probably so are their messages.

For Mr. Bagge's part, he will tell us this morning that controlling air pollution costs too much money. His message was the same in 1972, when the subject was the proposed emission standards for new powerplants. Instead of burning clean coal or operating new technologies such as scrubbers, the National Coal Association advocated the use of tall stacks.

For their part, the utilities have also been here before. A group of them testified in 1974 that clean eastern coal was too scarce to use, clean western coal could not be burned without massive retrofitting, and scrubbers were expensive and unreliable.

The Clean Air Coalition is also a familiar voice and message. They are urging the committee to once again report a bill to control acid rain and attempting to refute industry arguments.

So, it looks pretty much like business as usual, and the conventional wisdom is probably that if the industries have opposed truly effective air pollution controls for over a decade and, together with the executive branch, have resisted acid rain legislation for 7 years, they may be able to do it a little longer. That may be true for the remainder of this Congress. Given the impasse in the House, the chances this year seem slim to vanishing. But miracles do happen, especially at 3 a.m., 2 days before adjournment. In 2 years, this Senator must return to the voters of Vermont and ask for their approval of his performance during the preceding 6 years. I do not intend to take home a record of failure nor disappoint the millions of Americans who look to this committee and the Congress for leadership.

The truth of the matter is that the air in this country is a threat to the health of human beings, especially our children and the environment. The ozone standard is too weak to protect adults, the sulfur dioxide and oxide of nitrogen standards too weak to protect asthmatics, and all of them too weak to protect the lakes, streams, forests, and crops.

Ten years ago, ours was a country that set the world an example for pollution control and environmental protection. This is no longer the case. Indeed, on the subject of the need for acid rain control, the United States is now isolated. For the last 3 years, only the United Kingdom shared the United States view that more research was needed on acid rain. Now, as of 3 weeks ago, even the United Kingdom, our closest ally, has conceded.

It is difficult to win a battle like this in the absence of Presidential leadership. It is especially difficult in the face of the dedicated opposition from the executive branch. But these battles can be won, given enough time and energy. I have the time and am willing to exert the energy.

Next year, my highest priority will be to see that S. 2203, or legislation quite similar to it, is enacted, not just reported from committee and not just approved by Congress, but enacted. I am confident that a majority of my committee colleagues share this view.

At this time I would ask that the statements of Senators Byrd, Symms, and Humphrey be placed in the record at this point.

[The statements referred to follow:]

Statement
by
Senator Steve Symms
on Acid Rain
before the Environment and Public Works Committee
Thursday, September 25, 1986

Mr. Chairman:

I recognize your deep concern over acid rain and respect your dedication to pursuing a solution to a difficult and contentious issue. I commend your leadership.

Mark Twain once noted that "everyone talks about the weather but nobody does anything about it." It appears that this committee intends to move forward and do more than talk about acid rain. I understand the concerns that many members of this committee have and their feeling of urgency. However, even though there is general agreement that acidic precipitation is a very serious issue, the precise causes and most practical approach to avoiding further adverse environmental impacts is unclear. The concern I have is over the possible negative economic impacts of over-zealous national programs to control acid rain.

Idaho is a large, sparsely populated state whose economy is closely bound to the basic industries of agriculture, mining and wood products processing.

Mr. Chairman, I recognize, and the people of Idaho recognize, that no state or area can, or should be allowed to, divorce itself from a national problem. At the same time, any control strategy or program must recognize that the inland West is fundamentally different in terms of industry, population density and climatic conditions.

I hope that these hearings help develop a clearer picture of the causes of acid rain and the relative costs and benefits of a national program for reducing its occurence.

SEPTEMBER 25, 1986

STATEMENT OF SENATOR GORDON J. HUMPHREY

ACID RAIN LEGISLATION

I WOULD LIKE TO FIRST TAKE THE OPPORTUNITY TO THANK YOU, MR. CHAIRMAN, FOR SCHEDULING THESE HEARINGS ON ACID RAIN CONTROL LEGISLATION. AS IN THE PAST, YOU HAVE GIVEN CONSIDERATION OF THIS CRUCIAL ENVIRONMENTAL ISSUE THE ATTENTION AND HIGH PRIORITY IT DESERVES. THE EXTENSIVE DAMAGE WHICH INCREASES DAILY DUE TO THE EFFECTS OF ACID DEPOSITION PROVIDES A STRONG AND CONSTANT IMPETUS FOR LEGISLATIVE ACTION.

EARLIER THIS MONTH, I INTRODUCED AN ACID RAIN CONTROL BILL, S. 2813, WITH SENATOR PROXMIRE AND OTHERS. THIS BILL IS AN IMPROVED VERSION OF S. 503, A BILL INTRODUCED BY SENATOR PROXMIRE AND MYSELF IN FEBRUARY OF 1985 AND BASED ON AN AGREEMENT AMONG THE NATION'S GOVERNORS. THE ALLIANCE FOR ACID RAIN CONTROL, A COALITION OF GOVERNORS, ENVIRONMENTALISTS AND OTHERS, WORKED WITH SENATOR PROXMIRE AND MYSELF TO REWRITE S. 503. OUR NEW BILL CONTAINS A SIMILAR CONTROL STRATEGY TO THAT WHICH IS CONTAINED IN H.R. 4567, THE ACID RAIN MARKUP VEHICLE BEFORE THE HOUSE ENERGY AND COMMERCE COMMITTEE. I BELIEVE THAT THE SIMILARITIES BETWEEN S. 2813 AND H.R. 4567 WOULD WORK TO ADVANTAGE SHOULD ACID RAIN LEGISLATION PROGRESS TO CONFERENCE.

I AM PLEASED TO HAVE A CHANCE TO EVALUATE THE MERITS AND RAMIFICATIONS OF THE APPROACH TO ACID RAIN CONTROL CONTAINED IN S. 2813, AS WELL AS THE APPROACHES CONTAINED IN SENATOR STAFFORD'S BILL, S. 2203, AND OTHER PROPOSED LEGISLATION CURRENTLY BEFORE THE COMMITTEE. IT IS MY SINCERE HOPE THAT S. 2813 WILL BE GIVEN SERIOUS CONSIDERATION DURING THE ENSUING HEARINGS AND, IF THE OCCASIONS ARISES, WITHIN COMMITTEE MARKUP.

S. 2813 WOULD LEAD TO A REDUCTION IN SULFUR DIOXIDE EMISSIONS OF 10 MILLION TONS PER YEAR BELOW 1980 LEVELS. THIS EMISSION REDUCTION IS ACHIEVED THROUGH A TWO-PHASE, 31 STATE APPROACH WHICH REQUIRES A STATEWIDE AVERAGE RATE OF EMISSION OF 2.0 POUNDS PER MILLION BTUS BY 1992 AND 1.2 POUNDS PER MILLION BTUS BY 1997. OUR BILL IS CONSISTENT WITH LAWS WHICH HAVE ALREADY BEEN ENACTED BY SEVERAL STATES, SUCH AS NEW HAMPSHIRE, TO REDUCE ACID DEPOSITION. BY ALLOWING STATES A FREE CHOICE OF EMISSION REDUCTION STRATEGIES AND THE OPPORTUNITY TO ENGAGE IN BOTH INTER- AND INTRA-STATE TRADING,

S. 2813 ENCOURAGES COST-EFFECTIVE METHODS TO ACHIEVE THIS 10 MILLION TON REDUCTION. IN ADDITION, A TWO-PHASE APPROACH CREATES BOTH AN INCENTIVE FOR FURTHER DEVELOPMENT OF CLEAN COAL TECHNOLOGIES AND AN OPPORTUNITY FOR CONGRESS TO ADJUST THE REQUIREMENTS OF THE BILL BASED ON NEW RESEARCH.

NITROGEN OXIDE EMISSIONS WOULD BE REDUCED BY APPROXIMATELY 3 MILLION TONS BELOW 1980 LEVELS UNDER S. 2813. THIS REDUCTION WOULD BE ACHIEVED BY THE YEAR 1997 THROUGH THE USE OF RETROFIT TECHNOLOGY OR OTHER METHODS. NITROGEN OXIDE EMISSIONS WOULD BE FURTHER REDUCED THROUGH THE IMPOSITION OF TIGHTER CONTROLS ON AUTOMOBILES.

MANY INNOVATIONS CONTAINED IN S. 2813 SERVE TO STRENGTHEN THE OVERALL EFFECT OF THE BILL. FOR INSTANCE, S. 2813 REQUIRES THE INSTALLATION OF CONTINUOUS EMISSION MONITORING DEVICES ON ALL POWERPLANTS. I BELIEVE THAT THE DATA COLLECTED THROUGH THE USE OF THESE DEVICES WILL BE CRUCIAL TO OUR UNDERSTANDING OF THE CONTRIBUTION AND COMPOSITION OF EMISSIONS FROM INDIVIDUAL SOURCES. S. 2813 IS ALSO THE FIRST ACID RAIN BILL TO ENCOURAGE ENERGY CONSERVATION AS PART OF EMISSION CONTROL PROGRAMS.

S. 2813 ADHERES TO THE COMMITTEE'S TRADITIONAL "POLLUTER-PAYS" PHILOSOPHY. THIS APPROACH NOT ONLY DIRECTS THE COST TO THE PRODUCER, BUT IT PROMOTES THE USE OF COST-EFFECTIVE CONTROL TECHNOLOGIES. ACID RAIN CONTROLS WILL UNDOUBTEDLY BE COSTLY. IT IS IMPERATIVE THAT, AS WE WORK TO PROTECT OUR ENVIRONMENT, WE CONSIDER THE MARGINAL COST OF INCREMENTAL REDUCTIONS; THAT, AS WE LOOK AT THE LONG-RANGE EFFECTS OF ACID DEPOSITION, WE KEEP SIGHT OF THE LONG-TERM COST OF OUR LEGISLATIVE OPTIONS.

MR. CHAIRMAN, I LOOK FORWARD TO WORKING WITH YOU AND THE OTHER MEMBERS OF OUR COMMITTEE TO CONTROL AND REDUCE ACID RAIN. I AM CONFIDENT THAT TOGETHER WE CAN PROVIDE OUR COUNTRY WITH A VIABLE PROGRAM TO REDUCE SULFUR DIOXIDE AND NITROGEN OXIDE EMISSIONS AND THEREBY EFFECT NECESSARY AND TIMELY ACID RAIN CONTROLS.

TESTIMONY OF SENATOR ROBERT C. BYRD
HEARINGS ON ACID RAIN,
SENATE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
WASHINGTON, D.C.
SEPTEMBER 25, 1986

MR. CHAIRMAN, FIRST LET ME THANK YOU FOR PROVIDING ME WITH THE OPPORTUNITY TO APPEAR BEFORE THIS COMMITTEE TO PRESENT MY VIEWS ON THE DIFFICULT ISSUE OF ACID RAIN POLICY.

ONCE AGAIN, THE COMMITTEE IS CONSIDERING LEGISLATIVE PROPOSALS PURPORTING TO REMEDY A COMPLEX ENVIRONMENTAL PROBLEM. IN PARTICULAR THE COMMITTEE WILL BE GIVING ITS ATTENTION TO S. 2203, THE NEW CLEAN AIR ACT, WHICH I BELIEVE TO BE ONE OF THE MOST DRACONIAN, EXPENSIVE PROPOSALS CONSIDERED BY THE COMMITTEE TO DATE.

IT IS IRONIC THAT S. 2203 IS ENTITLED, "THE NEW CLEAN AIR ACT," IN VIEW OF THE FACT THAT THE EXISTING CLEAN AIR

ACT IS WORKING. FOR EXAMPLE, ACCORDING TO EPA'S 1986 REPORT ON NATIONAL EMISSIONS TRENDS, BETWEEN 1973 AND 1983, EMISSIONS OF SULFUR DIOXIDE DECLINED 28.7%. (CHART 1) MEANWHILE, ACCORDING TO THE NATIONAL COAL ASSOCIATION, THE USE OF COAL BY THE ELECTRIC UTILITY INDUSTRY DURING THAT SAME 1973-1983 PERIOD INCREASED 60.6%. (CHART 2)

MR. CHAIRMAN, S. 2203 IS ONE OF THE MOST EXPENSIVE ACID RAIN PROPOSALS TO BE INTRODUCED THUS FAR. ACCORDING TO A RECENT ANALYSIS BY THE CONGRESSIONAL BUDGET OFFICE OF THE COSTS AND COAL MARKET EFFECTS OF VARIOUS ACID RAIN PROPOSALS, THE TOTAL COST OF S. 2203 IS ESTIMATED TO BE $93.6 BILLION. CBO ALSO ESTIMATES THAT, UNDER S. 2203, THERE WOULD BE A REDUCTION IN U.S. COAL PRODUCTION IN 1995 OF 45.8 MILLION TONS, AND A LOSS OF 13,400 COAL MINING JOBS.

IT IS PARTICULARLY IMPORTANT TO UNDERSCORE THE ENORMOUS COSTS OF S. 2203, FOR THESE COSTS MEAN HIGHER ELECTRIC UTILITY BILLS. IN MY STATE OF WEST VIRGINIA, FOR EXAMPLE, CHART 1

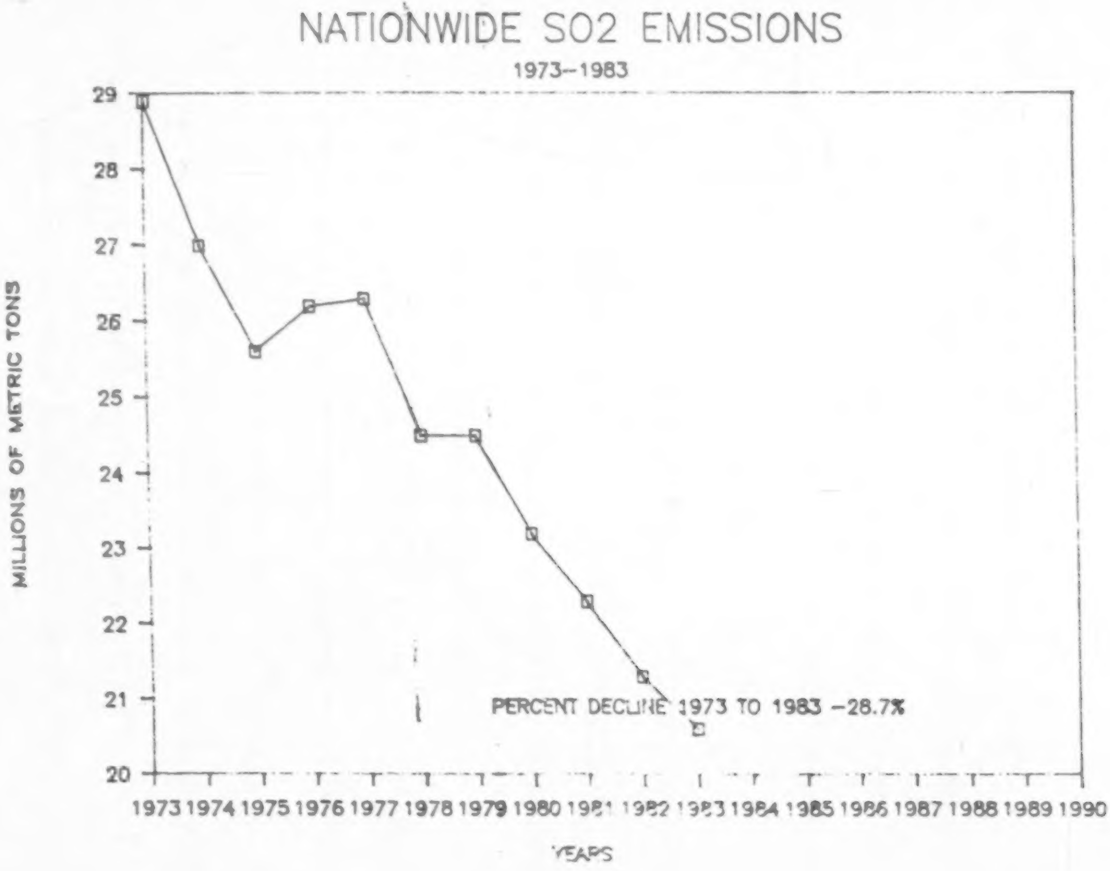
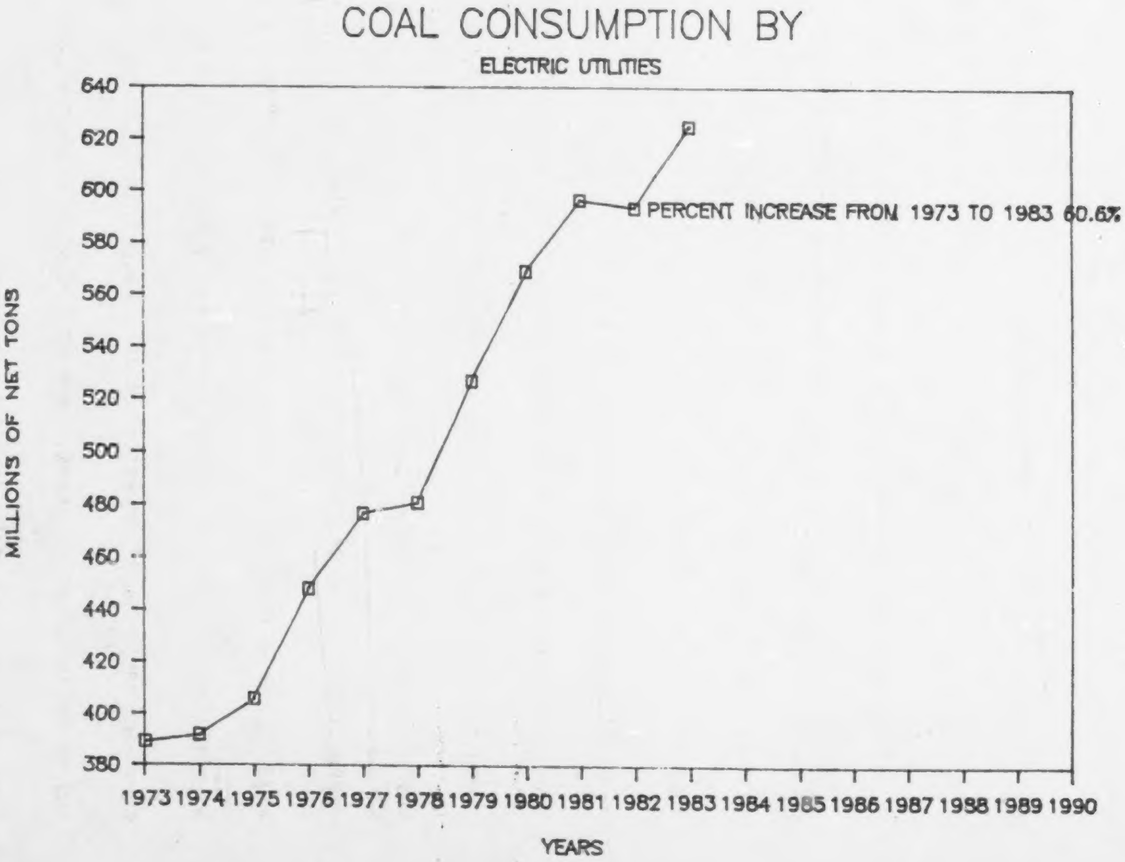

NATIONWIDE SO2 EMISSIONS
1973–1983
MILLIONS OF METRIC TONS
29
28
27
26
25
24
23
22
21
20
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
YEARS
PERCENT DECLINE 1973 TO 1983 –28.7%

CHART 2


COAL CONSUMPTION BY
ELECTRIC UTILITIES
MILLIONS OF NET TONS
640
620
600
580
560
540
520
500
480
460
440
420
400
380
PERCENT INCREASE FROM 1973 TO 1983 60.6%
1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990
YEARS

CBO ESTIMATES THAT ELECTRICITY PRICES IN 1995 UNDER S. 2203 WOULD BE ABOUT 150% HIGHER THAN WITHOUT SUCH LEGISLATION.

SUCH STEEP ELECTRICITY PRICE INCREASES WILL IMPOSE HEAVY FINANCIAL BURDENS ON THE RESIDENTS OF WEST VIRGINIA. IN ADDITION, ENERGY-INTENSIVE INDUSTRIES IN WEST VIRGINIA--SUCH AS ALUMINUM, GLASS, AND CHEMICALS--WILL ALSO BE FACED WITH LARGE INCREASES IN THE COST OF ELECTRICITY. THIS, IN TURN, WILL INCREASE PRODUCTION COSTS, AND WILL DRAMATICALLY ERODE THE COMPETITIVE POSITION OF THESE INDUSTRIES, ALL OF WHICH ARE BATTLING AGAINST STIFF FOREIGN COMPETITION. THE STEEP INCREASES IN THE PRICE OF ELECTRICITY WILL MEAN THAT SOME OF THESE INDUSTRIES, SUCH AS THE CHEMICAL INDUSTRY, WILL NO LONGER BE ABLE TO COMPETE IN THE WORLD MARKET. TO COMPOUND THE PROBLEM, FOREIGN IMPORTS WILL GAIN AN ADDED ADVANTAGE IN DOMESTIC MARKETS FOR WEST VIRGINIA INDUSTRIES SUCH AS ALUMINUM. THIS WILL MEAN THE LOSS OF THOUSANDS OF WEST VIRGINIA INDUSTRIAL JOBS.

MR. CHAIRMAN, MANY TIMES IN THE PAST I HAVE QUESTIONED THE WISDOM OF PURSUING REGULATORY RESPONSES TO THE ACID RAIN ISSUE BEFORE THE SCIENTIFIC EVIDENCE IS AVAILABLE TO ASSESS THE APPROPRIATENESS AND EFFECTIVENESS OF SUCH APPROACHES. FOR EXAMPLE, THE EVIDENCE IS AMBIGUOUS REGARDING THE EXTENT OF SURFACE WATERS ALLEGED TO HAVE BEEN ACIDIFIED BY ACID RAIN. THE RECENTLY PUBLISHED REPORT OF THE NATIONAL ACADEMY OF SCIENCES INDICATES THAT, OVER THE PAST SEVERAL DECADES, MANY LAKES IN WISCONSIN, NEW HAMPSHIRE, AND NEW YORK HAVE "DECREASED IN PH AND ALKALINITY AND MANY HAVE INCREASED IN PH AND ALKALINITY."

THERE MAY BE OTHER AQUATIC RESOURCES CONSIDERED TO BE "AT RISK" TO DAMAGE FROM ACID DEPOSITION. HOWEVER, THERE IS LITTLE SCIENTIFIC INFORMATION ABOUT THE "DOSE-RESPONSE" RELATIONSHIP -- THAT IS, THE RATE OF CHANGE IN THE STATUS OF LAKES IN RESPONSE TO ANY GIVEN CHANGE IN THE LEVEL OF DEPOSITION. THE DOSE-RESPONSE ISSUE IS JUST ONE OF THE KEY AREAS FOR WHICH SCIENTIFIC INFORMATION MUST BE DEVELOPED IF

POLICY-MAKERS ARE TO HAVE ANY CONFIDENCE THAT THE IMPOSITION OF A COSTLY NEW REGULATORY PROGRAM WILL BE EFFECTIVE IN ACHIEVING ANY OF THE PURPORTED ENVIRONMENTAL RESULTS.

FINALLY, LET ME POINT OUT THAT ACID DEPOSITION HAS BEEN BLAMED BY SOME FOR THE INCREASED MORTALITY OF RED SPRUCE IN EASTERN NORTH AMERICA, AS WELL AS THE DECLINE OF FORESTS AT PARTICULAR LOCATIONS IN EUROPE. BUT LITTLE IS KNOWN ABOUT THE CAUSES OF THIS SERIOUS ENVIRONMENTAL PROBLEM, AND, AS THE NATIONAL ACADEMY OF SCIENCES REPORT RECENTLY CONCLUDED, "THERE IS NOW NO INDICATION THAT ACIDIC DEPOSITION IS AN IMPORTANT FACTOR IN THE RED SPRUCE DECLINE."

MR. CHAIRMAN, I BELIEVE THE AVAILABLE SCIENTIFIC EVIDENCE REGARDING THE ENVIRONMENTAL EFFECTS OF ACID DEPOSITION INDICATES THAT A CRISIS SITUATION DOES NOT EXIST. IN FACT, A REPORT BY THE UNITED STATES GEOLOGICAL SURVEY, ENTITLED "TREND ANALYSIS OF WEEKLY ACID RAIN DATA--1978-83," SUGGESTS THAT THE SITUATION HAS IMPROVED. ACCORDING TO THAT REPORT, WET SULFATE AND NITRATE CONCENTRATIONS HAVE

MR. CHAIRMAN, THE INCREASED USE OF COAL AND THE PRESERVATION OF ENVIRONMENTAL QUALITY ARE NOT ANTITHETICAL. AS I MENTIONED EARLIER, THE DATA INDICATE THAT EMISSIONS REDUCTIONS HAVE BEEN, AND ARE BEING, ACHIEVED UNDER THE CLEAN AIR ACT. IN ADDITION, IN JANUARY OF THIS YEAR, THE HONORABLE DREW LEWIS AND THE HONORABLE WILLIAM DAVIS, THE SPECIAL ENVOYS APPOINTED BY PRESIDENT REAGAN AND PRIME MINISTER MULRONEY, RELEASED A JOINT REPORT ON THE ISSUE OF ACID RAIN. IN THAT REPORT, THEY CALLED FOR THE INITIATION OF A $5 BILLION CLEAN COAL TECHNOLOGY DEMONSTRATION PROGRAM, COST-SHARED ON A 50/50 BASIS WITH INDUSTRY, AS THE CORNERSTONE OF AN APPROACH TO THE ACID RAIN ISSUE. THE PRESIDENT'S ENDORSEMENT OF THAT RECOMMENDATION EXPLICITLY LINKED THE DEVELOPMENT AND USE OF CLEAN COAL TECHNOLOGIES TO THE ACID RAIN ISSUE.

HOWEVER, I SHOULD EMPHASIZE THAT THERE ARE IMPORTANT DIFFERENCES BETWEEN THE $5 BILLION CLEAN COAL PROGRAM RECOMMENDED IN THE REPORT OF THE SPECIAL ENVOYS ON ACID RAIN

AND THE CLEAN COAL TECHNOLOGY PROGRAM ENACTED BY THE CONGRESS IN 1984 AS PUBLIC LAW NUMBER 98-473, AUTHORIZING $750 MILLION FOR THE PROGRAM. THESE DIFFERENCES CAN BE SUMMARIZED VERY BRIEFLY BY NOTING THAT, UNLIKE THE INITIATIVE RECOMMENDED IN THE REPORT OF THE SPECIAL ENVOYS ON ACID RAIN, THE CLEAN COAL TECHNOLOGY PROGRAM IS NOT PRIMARILY DIRECTED TO ADDRESSING THE ACID RAIN ISSUE. RATHER, IT IS DIRECTED TO THE ENHANCEMENT AND EXPANSION OF THE USE OF COAL IN AN ENVIRONMENTALLY ACCEPTABLE MANNER.

NEVERTHELESS, THE LINKAGE OF THE ACID RAIN ISSUE AND CLEAN COAL TECHNOLOGY IN GENERAL IS BASED ON A RECOGNITION OF THE IMPLICATIONS OF NEW AND ADVANCED TECHNOLOGIES FOR USING COAL IN AN ENVIRONMENTALLY ACCEPTABLE MANNER RELATIVE TO THE ACID RAIN ISSUE.

THE CLEAN COAL TECHNOLOGY PROGRAM REPRESENTS A UNIQUE OPPORTUNITY TO FACILITATE THE WIDESPREAD ADOPTION OF NEW AND EMERGING COAL TECHNOLOGIES WHICH COULD ADDRESS THE CONCERNS OF PROPONENTS OF STRINGENT EMISSIONS CONTROLS, MORE

EFFICIENTLY AND MORE COST-EFFECTIVELY THAN CURRENTLY AVAILABLE TECHNOLOGIES. HOWEVER, S. 2203 RAISES QUESTIONS REGARDING THE IMPLICATIONS OF SUCH LEGISLATION FOR THE FUTURE OF THE CLEAN COAL TECHNOLOGY PROGRAM, AND FOR THE ADOPTION OF SUCH TECHNOLOGIES BY INDUSTRY. I DO NOT BELIEVE THAT INDUSTRY WOULD ADOPT CLEAN COAL TECHNOLOGIES UNDER THE PROVISIONS OF S. 2203.

IN THE LAST DECADE OR SO, THERE HAVE BEEN A NUMBER OF ECONOMIC, REGULATORY, AND OTHER DEVELOPMENTS WHICH HAVE CREATED SIGNIFICANT DISINCENTIVES FOR ELECTRIC UTILITIES TO COMMIT FINANCIAL RESOURCES TO THE CONSTRUCTION OF NEW GENERATING CAPACITY. INDEED, RATHER THAN UNDERTAKE NEW CONSTRUCTION PROJECTS, MANY ELECTRIC UTILITIES ARE MAKING PLANS TO EXTEND THE SERVICE LIFE OF EXISTING GENERATING FACILITIES BEYOND THEIR ORIGINAL DESIGN LIFETIMES, WHICH ARE USUALLY 30 TO 40 YEARS. ACCORDING TO THE ENERGY INFORMATION ADMINISTRATION (EIA), BY 1995 OVER 60% OF ALL COAL-FIRED POWERPLANTS -- ACCOUNTING FOR ABOUT ONE-QUARTER OF TOTAL

COAL-FIRED GENERATING CAPACITY -- WILL BE MORE THAN 30 YEARS OLD. BY COMPARISON, IN 1985 APPROXIMATELY 10% OF SUCH FACILITIES WERE MORE THAN 30 YEARS OLD.

THUS, IT IS CLEAR THAT THERE IS SIGNIFICANT OPPORTUNITY FOR THE ADOPTION OF CLEAN COAL TECHNOLOGIES FOR RETROFIT APPLICATIONS. THE EXTENT TO WHICH UTILITIES IMPLEMENT PLANS TO EXTEND THE LIFE OF EXISTING FACILITIES, AND THE EXTENT TO WHICH CLEAN COAL TECHNOLOGIES ARE AN INTEGRAL PART OF THOSE PLANS, COULD HAVE IMPLICATIONS FOR FUTURE EMISSIONS TRENDS.

THIS OPPORTUNITY HAS BEEN RECOGNIZED BY THE CONGRESS. THE FY 1987 APPROPRIATIONS FOR THE DEPARTMENT OF INTERIOR AND RELATED AGENCIES (H.R. 5234), WHICH WAS PASSED BY THE SENATE ON SEPTEMBER 16, INCLUDES LANGUAGE THAT RECOGNIZES THE OPPORTUNITIES FOR THE USE OF CLEAN COAL TECHNOLOGIES AT EXISTING FACILITIES. THE LEGISLATION DIRECTS THE DEPARTMENT OF ENERGY TO SOLICIT FROM THE PRIVATE SECTOR STATEMENTS OF INTEREST IN, AND INFORMATIONAL PROPOSALS FOR, CLEAN COAL TECHNOLOGY PROJECTS THAT ARE CAPABLE OF RETROFITTING, REPOWERING, OR MODERNIZING EXISTING FACILITIES. SUCH INFORMATION WILL BE VALUABLE IN DETERMINING THE SCOPE OF A SECOND PHASE OF THE CLEAN COAL TECHNOLOGY PROGRAM.

IT IS APPARENT THAT COAL WILL PLAY AN INCREASINGLY PROMINENT ROLE IN PROVIDING FOR THIS NATION'S ENERGY NEEDS FOR THE FORESEEABLE FUTURE. IN 1985, THE DOMESTIC ELECTRIC UTILITY INDUSTRY CONSUMED ABOUT 693 MILLION TONS OF COAL, WHICH ACCOUNTED FOR ABOUT 56% OF ALL ELECTRICITY GENERATED IN THE UNITED STATES. BY 1995, THE ENERGY INFORMATION ADMINISTRATION ESTIMATES THAT COAL-FIRED ELECTRIC POWER GENERATION WILL CONTINUE TO ACCOUNT FOR ABOUT 56% OF ALL ELECTRIC GENERATION, BUT UTILITY COAL CONSUMPTION BY 1995 IS EXPECTED TO INCREASE ABOUT 27% ABOVE 1985 LEVELS AS DEMAND FOR ELECTRICITY GROWS. IN THE LONGER-TERM, THE EIA ESTIMATES THAT BY THE YEAR 2010, COAL-FIRED ELECTRIC POWER GENERATION COULD ACCOUNT FOR ABOUT 60% OF ALL ELECTRIC GENERATION, AND UTILITY COAL CONSUMPTION COULD INCREASE ABOUT 95% ABOVE 1985 LEVELS.

THE COMMERCIAL ADOPTION OF CLEAN COAL TECHNOLOGIES FOR NEW ELECTRIC GENERATING CAPACITY AND RETROFIT APPLICATIONS AT EXISTING FACILITIES TO MEET THE NATION'S FUTURE ENERGY NEEDS TOGETHER ARE THE KEY TO PROMOTING THE MORE EFFICIENT USE OF THE NATION'S MOST ABUNDANT FOSSIL ENERGY RESOURCE, AND TO CONTINUING THE PROGRESS ACHIEVED TO DATE UNDER THE CLEAN AIR ACT. THE IMPLEMENTATION OF THE CLEAN COAL TECHNOLOGY PROGRAM IS THE FIRST MAJOR STEP IN THE EFFORT TO EXPAND THE USE OF COAL IN AN ENVIRONMENTALLY ACCEPTABLE MANNER.

UNFORTUNATELY, IF S. 2203 WERE ENACTED, I DO NOT BELIEVE THAT THE PROMISE OF THE CLEAN COAL TECHNOLOGY PROGRAM WOULD BE REALIZED. THE STRINGENT EMISSIONS STANDARD OF 0.7 POUNDS OF SULFUR DIOXIDE PER MILLION BTU'S IMPOSED BY THE BILL ON INDIVIDUAL GENERATING UNITS RULES OUT A NUMBER OF EMERGING TECHNOLOGIES. INDEED, THE EFFECT OF S. 2203 WILL BE TO FORCE UTILITIES TO SCRUB OR RETIRE CAPACITY.

CLEAN COAL TECHNOLOGIES, SUCH AS INTEGRATED COMBINED CYCLE COAL GASIFICATION AND PRESSURIZED FLUIDIZED-BED COMBUSTION OFFER THE POTENTIAL FOR MEETING THE STRINGENT 0.7 POUND STANDARD MORE ECONOMICALLY AND MORE EFFICIENTLY THAN CONVENTIONAL SCRUBBER TECHNOLOGY. HOWEVER, UTILITIES WILL PROBABLY NOT CONSIDER SUCH ADVANCED COAL TECHNOLOGIES TO BE REALISTIC OPTIONS FOR MEETING THE STANDARD IMPOSED IN S. 2203, BECAUSE THEIR DEMONSTRATION MAY HAVE ONLY BEEN COMPLETED IN THE 1990'S. THE UNIQUE OPPORTUNITIES REPRESENTED BY RETROFIT APPLICATIONS OF SUCH TECHNOLOGIES WOULD BE LOST BECAUSE UTILITIES WOULD BE VERY RELUCTANT TO GAMBLE ON TECHNOLOGIES WHICH HAVE NOT BEEN ADEQUATELY DEMONSTRATED.

I BELIEVE THAT THE CLEAN COAL TECHNOLOGY PROGRAM REPRESENTS THE FIRST BRIGHT GLIMMER OF A NEW DAY FOR THE FUTURE OF COAL. THE WIDESPREAD USE OF SUCH TECHNOLOGIES, ESPECIALLY AT EXISTING FACILITIES, COULD MAKE A POSITIVE CONTRIBUTION TO THE ACHIEVEMENT OF THE NATION'S ENVIRONMENTAL GOALS. HOWEVER, IF THE CONGRESS ENACTS LEGISLATION SUCH AS S. 2203, THE POTENTIAL OF THE CLEAN COAL TECHNOLOGY PROGRAM WILL BE FORECLOSED.

MR. CHAIRMAN, THAT CONCLUDES MY STATEMENT.

Senator STAFFORD. I am very pleased this morning that two of the main players in this battle over the years are here with me, and I will recognize Senator Mitchell of Maine.

OPENING STATEMENT OF HON. GEORGE J. MITCHELL, U.S. SENATOR FROM THE STATE OF MAINE

Senator MITCHELL. I thank you, Mr. Chairman, and I commend you for having this committee return to the issue of acid rain. We return to this issue in pursuit of necessary legislation to control the adverse effects of acid rain. While we continue to engage in a national debate, the scientific community continues to develop an ever stronger consensus that acid rain controls are needed to avoid further damage to lakes, streams, buildings, and to the health of the American people.

Some of the witnesses we will hear today will tell us again that acid rain controls are unnecessary, that the science is too uncertain, that there must be scientific certainty before we do anything. I strongly disagree. The risk of inaction is much higher than the risk of action.

It is, of course, true that there is not unanimity within the scientific community on the precise processes involved in developing acid precipitation. It is also true that there is rarely, if ever, unanimity within the scientific community on any but the most fundamental issues, and even then it takes a long time for that to develop.

It is worth recalling that it took scientists a very, very long time to agree on the shape of the Earth, the correct rotation of the solar system. Even today, some scientists contend that there is no causal relation between cigarette smoking and lung cancer. Does anyone in this room believe that? Does anyone suggest that we should not have a national policy in that area because there remains dispute within the scientific community? I doubt it.

Some of the comments I have heard suggest that even if acid rain is a problem, the solution is worthwhile only if it is inexpensive and easily attained. But the greatest expense to date appears to have been the cost of studies trying to prove what a particular bill will cost.

The Congressional Budget Office has estimated acid rain controls currently under consideration by Congress may cost between $2 billion and $10 billion a year. Bills that provide the maximum flexibility for achieving reductions, such as the legislation I have introduced, are among the least expensive.

While some insist that this country cannot afford acid rain controls, I would argue that we can no longer afford not to have acid rain controls. I believe it is inappropriate to ask whether this country can afford to let the problem of acid rain continue unabated. Every year that we fail to take effective action, the price tag goes up not only in dollar terms, but in terms of damage in our society. Each year, more fish die, more lakes and streams are acidified to the point where they cannot sustain life. Buildings and forests are affected.

Perhaps more significantly, there are increasing indications that the precursors of acid rain adversely affect the health of the American people, and we all know that health costs are increasing more than any other sector of our economy.

Mr. Chairman, I know that you and Senator Chafee share my view that we simply must get down to the serious business of determining which approach is the most effective for doing what is plainly necessary to do; and that is curbing acid rain.

Thank you, Mr. Chairman.

Senator STAFFORD. Thank you very much, Senator Mitchell.

Senator Chafee.

OPENING STATEMENT OF HON. JOHN H. CHAFEE, U.S. SENATOR FROM THE STATE OF RHODE ISLAND

Senator CHAFEE. Thank you, Mr. Chairman. I want to commend you and tell you that you have my wholehearted support in the effort you are undertaking. I think it is good that even though we are in the last days of the session, that we are looking toward the next session. In other words, we are saying this is our program, and you have delineated this as your number one priority. To that, I join with you. You have said that you have both the time and the energy, and I want to say that I have likewise.

So that on this issue we will definitely go forward next year, and the administration, as you pointed out, has not been helpful, but it is our hope that we can persuade them to not only assist us but to be a more positive factor far more than they have been in the past.

Let me just say something about the scientific view on this matter of acid rain. There is not unanimity amongst the scientists. We recognize that. But it seems to me that as legislators trying to do what is best for our Nation, that we cannot wait for unanimity. That is a luxury that is available to the scientists. They can go to their meetings and have disputes and submit papers and differ from one another because they don't have the responsibility of doing something about it—and we do. That is what we are hired for.

We frequently have to move frequently on less than completely precise information and we have to go ahead with, whether it's weapons systems or doing something about cigarette smoking, doing something about the greenhouse effect, doing something about acid rain, with less than perfect information.

Yet, I think we have a responsibility to do something. We are hired to make judgments, and we will make judgments and we will proceed on this.

So, Mr. Chairman, I want to congratulate you and say that I look forward to next year, and we have other environmental programs as well that we will be bringing up. This year we weren't totally successful. We have had problems with the endangered species. The Clean Water Act is in jeopardy because of the difficulties over the conference. There is a host of these matters.

I hope we can resolve them, but if we cannot, we will be back here and we will do them. Mr. Chairman, at the end of a session, we always think that next year we can proceed and get the matters done, and I certainly hope we can and get these programs that we are all so interested in passed as rapidly as possible.

Thank you, Mr. Chairman.

Senator STAFFORD. Thank you very much, Senator Chafee.

Now, Senator Burdick, do you have an opening statement?

OPENING STATEMENT OF HON. QUENTIN N. BURDICK, U.S. SENATOR FROM THE STATE OF NORTH DAKOTA

Senator BURDICK. Mr. Chairman, I have an opening statement, but in the interest of time I am going to ask that it be placed in the record.

However, I would like to point out one feature of it that I think is very important. The chairman will remember that I have constantly referred to this acid rain problem as the problem of the North American Continent and that I was a little bit critical of Canada in their efforts.

But I would like to report that recently the United States and Canada entered into an agreement on acid rain and to which the President has pledged his support. It contains a $5 million commitment to a fund a major program to research clean coal technologies. The joint report specifically recommends that special emphasis be given to the demonstration of retrofit technologies, especially those that can be applied to high-sulfur coal facilities.

I point this out, Mr. Chairman, because that was one of the issues I have been raising here from time to time, that we have to do something about our neighbors to the north because it is a problem of the continent.

[Senator Burdick's written statement follows:]

OPENING STATEMENT
QUENTIN BURDICK
ACID RAIN HEARING
FULL ENVIRONMENT COMMITTEE

SEPTEMBER 25, 1986

Good morning. Today the full committee will again look at the problem of acid rain.

As Committee members are aware, I, along with my colleagues Senators Proxmire, Humphrey, D'Amato, Simpson, Hollings, and Boschwitz, have recently introduced S2813, the Acid Deposition and Sulfur Reduction Act. I believe this bill represents the long sought after compromise that will provide increased environmental protection within a reasonable period of time, while still allowing enough time to better define the problem and develop new and cheaper technological approaches to finally solve the problem. The major distinguishing feature of our bill is that it is both time and location phased. In the first phase, States east of the Mississippi would be required to reduce average emissions of SO2 to 2.0 lbs. per MMBtu by 1992. In the second phase, these states, plus any western states designated by the EPA Administrator, would have to reduce to a 1.2 lb standard by 1997.

Few would dispute that the term "acid rain" describes a complex and delicate scientific phenomena that is barely understood today. Similarly, few would dispute that we need to move ahead to address the issue, even in the face of our lack of knowledge. The real question before us is how far do we go and how fast.

Some would argue that the Clean Air Act is working. Indeed, according to the Environmental Protection Agency's 1986 report on national emissions trends, between 1973 and 1983, emissions of SO2 declined twenty-eight percent. Meanwhile, according to the National Coal Association, the use of coal by electric utilities increased sixty-eight percent during that same time period.

When Congress enacted the Clean Air Act, however, it was expected that major reductions in emissions would come about as older facilities were replaced by new ones subject to the New Source Performance Standards. This has not happened. The "life expectancy" of utility plants and other major sources of air pollutants has dramatically increased in the last decade and this trend will obviously continue. Acid rain legislation considered by this or any other Congress must deal with the reality of this fact: if SO2 emissions are to be reduced, the major source of the reduction must, of necessity, come from existing facilities.

Which brings us to the subject of the emerging clean coal technologies. If acid rain legislation were enacted, few would argue that the existance of more numerous and less costly techniques to reduce emissions, particularly for existing facilities, would be helpful. One vehicle to encourage the timely development of these technologies is the Clean Coal Technology Reserve established in the 98th Congress and designed to provide up to $750 million in federal support for emerging control technologies. The Department of

Energy is now in the process of funding nine demonstration projects which will use approxsomately $ million of the reserve. In addition, EPA and private industry are carrying out active research programs.

Last, the recent United States - Canadian agreement on acid rain, to which the President has pledged his support, contains a commitment of $5 billion to fund a major United States program to research clean coal technologies. The Joint Report specifically recommends that special emphasis be given to the demonstration of retrofit technologies, especially those that can be applied to high-sulfur coal facilities.

Clearly, all of these efforts will take time to bear fruit. We must have this time, however, in order to assure that the most cost-effective means of controling acid rain are those that are,in the end, employed.

This hearing is being held because of the deep concern about acid rain felt by the Chairman of this Committee and, indeed, by all its members. I shall be particularly interested in hearing what our distinguished list of speakers have to say on the subject of both the need for action and the timing of such action on this vital subject.

Senator STAFFORD. Thank you very much, Senator Burdick. I think we all agree that acid rain is a global problem as well as a continental problem for North America.

Senator Baucus, do you have an opening statement?

OPENING STATEMENT OF HON. MAX BAUCUS, U.S. SENATOR FROM THE STATE OF MONTANA

Senator BAUCUS. Yes, I do. Thank you, Mr. Chairman.

Mr. Chairman, I commend you for holding these hearings to address the issues regarding the Clean Air Act. Although it is late in the Congress and it is unlikely that the Clean Air Act amendments will pass in the remaining few days, air pollution is a serious problem that deserves the attention of this committee. We must continue to make progress toward finding a resolution.

The evidence is clear. Existing levels of air pollution cause serious damage to public health and the environment. Earlier this year, the National Academy of Sciences demonstrated the link between acid rain and environmental damage to lakes and streams hundreds of miles away. The President has agreed that air pollution is causing acid rain damage.

There is increasing evidence of widespread damage to our forests and crops caused by a plethora of air pollutants, probably most importantly, ozone. While most of the recent attention has focused on secondary or environmental impacts of air pollution, the body of evidence continues to grow that even our primary or health-based standards are not meeting the objectives of the Clean Air Act, as originally passed. It is becoming increasingly clear that the primary standard for SO_2 needs to be lowered. The problem is no longer a problem of acid rain, it is a nationwide problem of clean air. It is a question of whether or not Congress and the President have the commitment to protecting the air that people breath and that surrounds us where we live.

During both of the last two Congresses, this committee has reported legislation to reduce pollution from powerplants in the eastern 31 States. This approach is locked in the death grip of regional protectionism. The high-sulfur coal industry is pitted against the low-sulfur coal industry; New England against the Midwest.

Earlier this year, with your leadership, Mr. Chairman, a bill with a new approach was introduced. I am a cosponsor of that bill and look forward to working with you to report legislation similar to it.

This legislation represents the first approach to actually build on the existing Clean Air Act rather than creating a new, complex regulatory program on top of existing programs. The entire premise of the Clean Air Act and its reliance on stringent standards for new sources was that old sources—that is, old powerplants—would be retired after a reasonable period of time, and emissions would be an ever-increasing downward spiral.

The reality has shown that factors such as technology, cost of capital, and to some extent the Clean Air Act itself, has made it increasingly desirable to refurbish rather than build new powerplants. Refurbishment is a fact of life. It is good public policy to recognize this fact and place a useful life on all powerplants.

Over time, a consensus will develop around the useful life concept. This approach will maintain a balanced, level playing field between competing coal interests. It is the only approach that provides long-term reductions in emissions.

Any of the short-term acid rain reduction bills currently before us will only lead to increasing emissions. In as few as 10 years after the cutbacks have been achieved, emissions will start to decline.

One of the features touted most often in favor of rollback acid rain bills is the notion that the cost of implementing acid rain controls would be reduced through allowing for State emissions trading and, therefore, bubbles. This approach is unrealistic. There is absolutely no proven track record under the current Clean Air Act. For example, with approximately 15 months, the ozone compliance date will be upon us. It has become apparent that 80 million people will be subjected to ozone levels that exceed national ambient air quality standards.

In addressing ozone problems, we have no choice but to rely upon a bubbling concept, since ozone is a byproduct of a number of pollutants, including nitrous oxides, hydrocarbons, and carbon monoxide. Just look at the difficulties that cities around the country are having in meeting ozone standards and ask yourself the question whether or not statewide emission trading makes any sense.

S. 2203 has an aggressive program to deal with hydrocarbons, carbon monoxide, and nitrous oxide from mobile sources. These pollutants are the culprits that cause ozone. Ozone is a serious health threat throughout much of North America, and it is likely to be a major cause of forest decline. These same pollutants, as they move into the upper atmosphere, have been implicated as the culprit in global warming.

I am not sure if the standards called for in our bill are the absolute correct answer, but it is clear that we need an aggressive program dealing with all three of these pollutants.

One other issue. The EPA is preparing to undertake a rulemaking to require new woodstoves to attain stringent emissions limitations. I commend the EPA for their initiative. Woodsmoke is a serious problem throughout the entire country. When we look back at this issue next year, I plan to review very carefully where the EPA is headed in regard to implementing these regulations.

I look forward, Mr. Chairman, to these series of hearings and hope they will lead to speedy consideration of the Clean Air Act amendments during the 100th Congress. Thank you.

Senator STAFFORD. Thank you very much, Senator Baucus.

[Senator Lautenberg's opening statement follows:]

STATEMENT BY SENATOR FRANK R. LAUTENBERG SEPTEMBER 25, 1986
(EPW HEARING ON ACID RAIN)

MR. CHAIRMAN, I COMMEND YOU FOR SCHEDULING THIS HEARING ON ACID RAIN--ONE OF THE PRIMARY ENVIRONMENTAL PROBLEMS OF OUR TIME.

100,000 TONS OF SULFUR DIOXIDE POLLUTION IS SPEWED OUT OVER OUR CITIES, FORESTS, RIVERS, AND LAKES EVERY DAY. LEFT UNCHECKED, THESE EMISSIONS WILL INCREASE IN THE YEARS AHEAD.

ACIDIFED LAKES IN THE ADIRONDACKS BEGAN TO DRAW ATTENTION IN THE LATE 1970´S. IN 1984, THE OFFICE OF TECHNOLOGY ASSESSMENT REPORTED THAT 9000 LAKES AND 117,000 MILES OF STREAMS ARE AT RISK IN STATES EAST OF OR BORDERING THE MISSISSIPPI. AND SCIENTISTS ARE NOW DISCOVERING THAT THE PROBLEM EXTENDS WEST TO COLORADO, CALIFORNIA, AND THE STATE OF WASHINGTON. EVIDENCE SUGGESTS THAT THIS FOREST DAMAGE IS LINKED TO ACID RAIN RELATED POLLUTANTS.

NEW JERSEY ALSO HAS SEEN THE EFFECTS OF ACID RAIN AND ITS RELATED POLLUTANTS. DECREASED GROWTH AND FOLIAGE CHANGES IN THE PINE BARRENS MAY BE ATTRIBUTABLE TO POLLUTANTS. CORRELATION OF ACIDIFIED STREAMS AND REDUCED PRODUCTIVITY OF PINES IN THE LEBANON STATE FOREST WAS THE FIRST INDICATION ON THE EASTERN SEABOARD THAT ACID RAIN MAY BE DAMAGING OUR FORESTS. ALSO, IN

NEW JERSEY'S KITTATINNY MOUNTAINS THREE LAKES ARE THREATENED. ACIDITY LEVELS ENDANGER TROUT AND BASS BREEDING.

FURTHER, MR. CHAIRMAN, AS WE HEARD AT OUR JUNE HEARINGS, THE EVIDENCE IS BUILDING ON THE HEALTH EFFECTS OF AIR POLLUTANTS RELATED TO ACID RAIN. SOME RECENT STUDIES INDICATE THAT MORE PEOPLE DIE PREMATURELY FROM AIRBORNE SULFATES EACH YEAR THAN DIE ON OUR NATION'S HIGHWAYS. EVIDENCE SUGGESTS THAT CHRONIC COUGHING IS MORE COMMON IN REGIONS WITH HIGHER SULFUR DIOXIDE AND PARTICULATE POLLUTION, AND THAT SERIOUS RESPIRATORY PROBLEMS RESULT FROM INCREASED OZONE CONCENTRATIONS.

THE OZONE PROBLEM IS OF PARTICULAR SIGNIFICANCE TO NEW JERSEY, WHICH IS UNLIKELY TO MEET THE 1987 FEDERAL DEADLINE FOR OZONE REDUCTION DESPITE VERY STRINGENT STATE LAWS. ACCORDING TO THE N. J. DEPARTMENT OF ENVIRONMENTAL PROTECTION, A CONTRIBUTING FACTOR TO NEW JERSEY'S OZONE PROBLEM IS THE PREVAILING WESTERLY WINDS THAT CARRY THE COMPONENTS OF OZONE--NITROGEN OXIDES, HYDROCARBONS, AND OTHER CHEMICALS--FROM MIDWESTERN STATES WHICH HAVE WEAKER ENVIRONMENTAL STANDARDS FOR UTILITIES AND INDUSTRIAL FACILITIES.

ENOUGH EVIDENCE IS IN. IT IS TIME FOR CONGRESS TO ACT. I LOOK FORWARD TO WORKING WITH YOU, MR. CHAIRMAN, AND THE COMMITTEE, IN THE BATTLE TO PROTECT OUR FORESTS, LAKES, AND HEALTH FROM THESE INSIDIOUS FORMS OF POLLUTION. I WELCOME THE WITNESSES HERE TODAY AND LOOK FORWARD TO HEARING THEIR VIEWS ON THIS CRITICAL ISSUE.

Senator STAFFORD. Now I think we are ready to begin with our witnesses. We are honored this morning that the first witness will be our colleague from Wisconsin, Senator Proxmire.

Senator, we welcome you to this hearing room, and we are honored that you come to join us.

STATEMENT OF HON. WILLIAM J. PROXMIRE, U.S. SENATOR FROM THE STATE OF WISCONSIN, ACCOMPANIED BY NED HELM, EXECUTIVE DIRECTOR, ALLIANCE FOR ACID RAIN CONTROL

Senator PROXMIRE. Thank you very much, Mr. Chairman.

Mr. Chairman, may I have Mr. Ned Helm, who is the executive director of the Alliance for Acid Rain Control, sit at the table with me?

Senator STAFFORD. Certainly.

Senator PROXMIRE. First, Mr. Chairman, I want to thank you for permitting me to testify, and I also want to thank you for your statement and the statement of every Senator who is here today. They were unanimous, bipartisan, and very emphatic about action, effective action, to do something about this acid rain menace, and I think that this is most encouraging.

Mr. Chairman and members of the committee, I appreciate the opportunity to appear before you this morning to testify in support of S. 2813, the bill I have cosponsored with Senators Humphrey, Simpson, Burdick, D'Amato, Hollings, and Boschwitz. This bill enjoys the enthusiastic support of the Alliance for Acid Rain Control, a broad based, bipartisan coalition of nine Governors, corporate leaders, academicians, and public interest groups, representatives headed by Gov. Tony Earl of my State of Wisconsin. The cosponsors of S. 2813 are indebted to the Alliance for its help in developing what we hope will be a path-breaking bill.

Let me begin by commending the members of this committee and, in particular, Chairman Stafford and Senators Mitchell and Moynihan for your diligent efforts on the acid rain issue. The committee is currently considering a number of acid rain bills. However, my comments this morning focus on just two of these bills, S. 2813 and S. 2203, the latter, of course, the bill sponsored by you, Mr. Chairman, as well as a number of other members of this committee.

S. 2203 sets out a very ambitious target for acid rain reduction, a goal toward which we can all strive. It also embodies the critical polluter pays principle, which I strongly support.

The central element of our bill is the two-phased pollution reduction approach with the opportunity for midcourse corrections based on research results. By achieving reductions in two phases, our bill allows the use of least cost methods such as switching to low-sulfur coal and coal washing to achieve the first 5 million tons of sulfur dioxide reductions. The flexibie based approach allows time for use of research results produced in the first phase and the shaping of the second-phase strategy rather than locking the program into a one-phase strategy that is far more difficult and far more expensive to alter later.

Equally important, the phasing approach encourages development of clean coal technologies for meeting the much more costly second 5-million-ton sulfur dioxide emission reductions. Although these technologies promise to provide emission reductions much more cheaply than existing technology, they will not be commercially available until as late as 1992, according to the Department of Energy's Energy Research Advisory Board.

The S. 2813 timetable is designed to fit with this schedule, as phase 1 is to be completed by 1992 and final decisions on phase 2 strategies to be made as late as the end of 1993.

The Congressional Budget Office estimates place the cost of S. 2203 at $93.6 billion over 20 years. This is almost three times as high as the rough estimates for the sulfur dioxide reduction strategy similar to the one suggested in our bill, and more than three times as the $25.9 billion estimate for the Sikorski-Waxman bill currently being considered in the House.

A preliminary analysis by ICF, Inc., recently completed for EPA, finds even higher costs. The new study lists S. 2203's cost for SO_2 reductions at $12.03 billion annually and the cost of its NO_x controls at $10.04 billion annually, for a grand total of $22.7 billion a year. The study points out that this is nearly eight times the estimated total annual cost of H.R. 4567 and S. 2813. From the consumer's point of view, these types of costs are hard to justify. Proponents of S. 2203 argue that such cost discrepancies are exaggerated, because some coal fired plants could meet the S. 2203 standard by switching to low-sulfur coal.

I believe the evidence is quite the contrary. A recent study conducted by Resources Data International, for example, indicated that only 4 mines out of the approximately 4,900 active mines in 1985 consistently produced coal clean enough and with a high enough BTU content to meet the standards set in S. 2203. Together, these mines produced 10.4 million tons of coal in 1985 and have a maximum production capacity of 27 million tons.

Development of a new western mine takes an average of 8 to 10 years. New mines designed to exploit coal reserves capable of meeting a 0.7 pound per million BTU emission rate could not be in operation by 1991 unless the process were already more than half completed.

In addition to these constraints, S. 2203 further discourages the use of ion-sulfur coal through its provision requiring that all existing powerplants comply with the new source performance standards when they reach 35 years of age. This basically means plants must put on scrubbers.

In contrast, S. 2813 provides States and sources complete freedom in choosing their methods of reducing SO_2 emissions. Consumers are given real protection from unnecessarily high increases in their electric rates because of this flexible approach which encourages the most cost-efficient solutions for emission reductions.

Furthermore, S. 2813 improves on both the House bill and S. 2203 by encouraging use of energy conservation strategies for controlling emissions. It takes a positive step toward reducing the country's energy consumption at the same time we are reducing environmental damage to our lakes and forests.

In sum, I want to stress that we introduced S. 2813 at this time to get some important ideas on the table. I know that all of us who are joined together on this bill want to work closely with you, Mr. Chairman, in developing acid rain legislation that deals effectively both with the issues and with the political problems of winning Senate approval. Your leadership on this issue has been deeply appreciated. I hope that you and the other members of the committee will consider the elements of S. 2813 as you fashion a package for Senate floor consideration. Thank you, Mr. Chairman.

Senator **STAFFORD**. Thank you very much, Senator Proxmire. We certainly will consider the bill that you have been describing, and we appreciate your appearing here as a witness.

I don't know whether any members have questions for the Senator or not. Are there any questions?

Senator **CHAFEE**. Delighted to see him.

Senator **STAFFORD**. We are indeed. We understand if you must leave, but you are welcome to stay if you would care to.

Senator **PROXMIRE**. Thank you very much, Mr. Chairman.

Mr. Chairman, may I ask that my full statement be put in the record?

Senator **STAFFORD**. Without objection, your full statement will appear in the record.

Senator **PROXMIRE**. Thank you.

Senator **STAFFORD**. We are honored also this morning to have a fellow New England Senator here in the hearing room with us, Senator Kerry of Massachusetts.

We would be very pleased to hear from you, Senator.

We will place your entire statement in the record, and leave you the option of reading it or summarizing it, as you wish.

STATEMENT OF HON. JOHN F. KERRY, U.S. SENATOR FROM THE STATE OF MASSACHUSETTS

Senator **KERRY**. No, I won't read my statement, Mr. Chairman. I would just like to make some comments if I may. But I appreciate enormously the opportunity to appear before the committee, and I really am grateful that, from a New England perspective and I think a national perspective, that you are raising this issue at this time, and was said by one of my colleagues in his opening comments, I think it is vital that we set the agenda now for the beginning of next year. I am delighted that the committee is doing so.

Obviously, I am talking to the converted. At least the comments of the committee seemed to indicate that. But I would like to share with the committee a few perceptions if I may.

I began to become involved in this issue when I was responsible for Federal-State relations as Lieutenant Governor in Massachusetts, and I was appointed by Governor Dukakis at that time to serve on the National Governors' Association Task Force, which I did with great pleasure, as 1 of 10 members of that task force working with Governor Sununu, Governor Lamb, Governor Rockefeller, and others.

In the course of that, I took a journey to Europe on a factfinding mission for the New England Governors Task Force, and I went to Norway, I went to Sweden, I went to Belgium, Germany, and Great

Britain. In Norway I spoke with almost every one of their experts who had been coping with this issue for a long period of time, where there are some 5,000 square miles of lakes that are now dead, and they have no doubts—no doubts—from any quarter as to what has caused that.

In Sweden, some 18,000 lakes that are dead, and no one in Sweden contests the issue of how or why that has come to happen. In addition, in Sweden they were particularly concerned about increasing evidence of trees that were showing less growth and the concentric circles were diminishing, and they had no doubt that at least that was the ambient air quality that was causing it, certainly ozone and other things contributing, but to which clearly SO_2 was a major contributor.

In Germany I saw perhaps the most stark and dramatic and moving display of what has happened because of inattention to this matter. I visited the Black Forest. I went up there with their foresters, who literally were close to tears over the disappearing before their eyes of the very heritage of their country. And for those who know something of that region, the Black Forest is steeped in German folklore and in the very essence of who they are as a people. Those trees are going, and they have no doubt as to what is causing it.

Recently, Great Britain, which was one of the reluctant sort of participants in any of the dialog, has finally joined in acknowledging that it is a problem, that they have to face up to it, and that they are a primary contributor to the problems in Norway and of Western Europe because of the flow of winds.

It is, therefore, even more dramatic and disappointing that here in this country, after all that President Reagan has said with respect to the creation of studies, the panels that he himself has commissioned, each of which have come back and said it is a major problem, we are still ignoring it. I therefore hope the committee will undertake somehow to finally move this issue in the course of the next session.

Now, in Massachusetts, we have been conducting an ongoing study since 1983 to try to provide a data base. Dr. Paul Godfrey of the University of Massachusetts has diligently been tracking the situation in Massachusetts. We feel we have enough data now to really have an understanding of our own situation. I would report to you simply quickly sharing with you some of that data.

In our State, 6 percent of all the surface waters that we tested are classified as now acidified or have a pH of 5 or less; 16 percent are critical; 19 percent are endangered; 21 percent are highly sensitive; 23 percent are sensitive; 15 percent are not sensitive. So that means that 62 percent of our surface waters tested are classified as highly sensitive to acidification. If I were to show you a map of our State [indicating], the green areas being the only areas which are safe, you can see that the red and yellow and orange, which are the dominant areas of low alkalinity, which are most impacted, is practically our entire State.

For those who have been following this issue, though, it is obvious that that is just one small piece of the problem and it is not just rain, it's fog, it's mist, it's even dry precipitation.

In addition, for those who care about the issue of individual health, those who have bronchitis, those who have heart problems, ailments, clearly the particulates themselves are an issue. We are spending $12 million a year in Massachusetts on statuary, simply to rehabilitate them: Works of art, our parks, statues, and others that are literally being eaten away by the acid. Each year now, we are spending maybe $1.2 to $2 million to restore that work. If you were to multiply that across this Nation, the number of statues that you look at that are turning green, the amount of marble that has deteriorated, it is an enormous, enormous cost to the country as a whole.

In addition, there are the recent studies with respect to the forests of this country, not to mention the questions of crops and other damage that we have not even yet begun to measure, but if we extrapolate from the European experience, what I heard my colleague from Rhode Island say about making best judgments and asserting the value judgments that we are called on to make as Senators, would I think predicate that we not delay one instant longer but that we proceed.

Now, the issue among this group certainly that have spoken is not so much whether we want to proceed but how to proceed. It is obviously a contentious issue, with costs, and whenever we hear about costs in today's world, it becomes difficult. If I could just share with you very quickly a few of the findings that we came to which I tried to embrace in a bill that I have submitted—and I am not here to shill for my bill; I have no proprietary interest in this at all. I simply think if we can gather the best of all that is on the table, we can come up with a good solution.

But what we did find in the course of discussing the matter in the Governors' task force was that there was a final meeting of the minds, if you will. In the effort to bring the Midwest into the solution and the effort to bring the West, which has done much and has lesser amounts of contributing to the problem, in the effort to bring the Northeast in in a way that met the demands of the polluter pays theory but at the same time contributed to the notion that it's a national problem, we did reach a compromise.

We were able to say as a group that represented many diverse interests that we thought there ought to be a cost-sharing effort, that we ought to try to mitigate somewhat for a problem that represents a way in which the Nation has done business, and not simply point a finger at the utilities or point a finger at the coal people and say, "Well, it's your fault. It's too bad."

It is a national problem. We want to mitigate as much as we can the costs for each of the parties. Is there a way to do that?

I think there is a way to do that, a way that reflects the best of the polluter pays concept while at the same time not bankrupting companies and putting them at economic disadvantage so that they cannot continue to compete in a continually competitive world. In addition, I think it is possible to try to satisfy the high-sulfur/low-sulfur dilemmas of West Virginia and some of the Western States. The way to do that is, obviously, you have got to reach a compromise.

I am recommending that we allow as much flexibility as possible. I heard Senator Proxmire talk about it. I think it is not wise to try to mandate scrubbers or mandate a specific technology. I think we should leave as much flexibility to the States to undertake either fuel switching or the new technologies or the new research which may put those technologies in place, but allow them to decide which plant may phase out, which one will come online and meet the standards of reduction.

To do that, I am recommending personally that we create a fund that would subsidize the cost of capital equipment to reduce emissions based on a payment of about $147 per ton reduced, and the payment formula by which you would gather that would favor the installation of capital equipment to avoid coal miner job displacement while fixing the subsidy at a level which will permit the use of newer and less costly technologies.

I would recommend the setting up of a three-tiered graduated fee on electricity generation which collects that subsidy, and that creates, I think, an equity by shifting the burden from areas of the country where sulfur emissions are currently lower to those areas which do have greater emissions but which will as a result receive greater amount of subsidy from the fund to permit them to catch up to other parts of the country. So I think there is a balancing of those people who have cleaned up, putting in less money, reflecting their cleanup, but do it on a graduated scale that tries to draw the best of those principles of equity with the best of our needs to be able to bring people into the solution, if you will, in a way that doesn't displace jobs and create an inequity in the process.

I will submit that plan in considerably greater detail, Mr. Chairman. It is already stated.

But, in addition to this, I recommend a fund for research and development funding which will assist us in the process of bringing these new technologies online, whether it's lime injection burning or beds, fluidized beds or whatever. I think the technology can be there very quickly once we have a mandate, and I think if our mandate is flexible enough to allow that technology the time to come online, it would not be as costly a process as many people have asserted.

So, in closing, Mr. Chairman, again I want to thank you for the opportunity to testify on this. I would like to submit for the record an executive summary of a report which Governor Dukakis and I did, called "Acid Rain and Related Air Pollutant Damage: A National and International Call for Action," based on the work we have done in our State. I would hope very much that in the course of next year I and others will be able to join with you in cooperating to try forge a compromise on this issue.

But I cannot underscore how critical I think it is from the broad perspective of the interests that are at stake, and I thank you for this opportunity.

Senator **Stafford**. Thank you very much, Senator Kerry. We, without objection, will make the study you described a part of the record. [See p. 71.]

We also want to thank you for your offer of cooperation and look forward to having you work with us next year.

Are there any questions of Senator Kerry?

Senator **Burdick**. I would like to ask him one question. My State is one of the border States in the central part of this country and the West, and I know the prevailing winds are from the Northwest. Do you or do you not agree that we aren't going to solve this problem until we have the active cooperation from Canada?

Senator KERRY. I totally agree that there is no question but that we need cooperation from Canada. We have a dual problem with Canada, obviously. We provide to them and they have provided to us, as a matter of fact. But we have met. I went to the eastern Canadian Premier's conference, where we raised this issue, and I think they now recognize there has been an element of perhaps we can call it neglect on their part to fulfill some of their obligations with respect to the issue.

But there is also a bitterness on their part, which I also think is justified, with respect to our inattention to this matter. I think that we are providing far more to them than they to us. So, I think, you know, until we show ourselves more clearly determined to resolve the problem, I think it's going to be difficult to create the climate for that compromise.

Senator BURDICK. North Dakota has put 25 percent of the cost of the powerplants into scrubbers, to make an effort. I have been told that there isn't a scrubber in the whole country of Canada. Is that correct?

Senator KERRY. I have been told that also, yes.

Senator BURDICK. In other words, we have to have some active cooperation if we are going to solve this problem.

Senator KERRY. There is no question but that we need that. But, I mean, each of us is sitting in that same situation. I think it is a question of who is going to get off the dime and begin to move. You know, we have passed our own acid rain control bill in Massachusetts. We are reducing our own emissions. But we are sitting on the coastline.

Our problem isn't Massachusetts, even though we recognize that the larger particulates—and there is an immediate spillover in the vicinity of any kind of plant and that does damage, so we are trying to clean our own house simultaneously. But we are burning, I think, at a rate of about, well, less than 1.2 at this point in time, 0.7 or somewhere in that vicinity, and we have got States out in the Midwest which are directly in the line of fire toward us who are burning at 12 and 11 and 10, and haven't begun to reduce.

So, while we are pointing fingers at other countries, we are also continuing to have this problem transboundary among ourselves, and I think if we began to get our house in order, we would create a climate whereby the dealings with Canada would be much easier.

Senator STAFFORD. Are there any further questions? Senator Chafee?

Senator CHAFEE. Yes. First, I would just like to say that I agree with the Senator from Massachusetts that we cannot be in an "Alfonse/Gaston" situation, "You go first. You go first." It seems to me that we are a big nation, obviously. I have talked to the Canadians, as has the Senator from Massachusetts. The Canadians are deeply resentful of what the United States has done. I am convinced in my own mind that if we proceed and do something about this, that the Canadians will follow on, or they might even precede us. But I don't think, because the Canadians haven't done anything gives us a reason to say, "Well, we're not going to do anything until they do something."

I would like to ask the Senator what about Europe. You have been to Sweden, Norway, and Western Germany. What are they doing? Have they had any success? Take the Swedes, they're pretty bright people, and diligent and deeply interested in the environment. What have they done?

Senator **Kerry**. The Swedes are, unfortunately, in a position where the very best they can do at this point is mitigate. They are spending millions of dollars on a major program to transport lime. They are liming their lakes; that is essentially what they're doing. They are trying, through the European Community, which met last year, I think—and the Soviets, incidentally, have joined in an effort to reduce transboundary pollution by about 30 percent. I forget the exact time period.

But they have been trying to place pressure within the European Community on an agreement, on reaching an agreement, on that reduction rate of transboundary pollution, and they are making significant progress in doing so.

Senator **Chafee**. But, I mean, they take preventive measures or mitigation rather than——

Senator **Kerry**. Well, they're not providing any of their own pollution.

Senator **Chafee**. In other words, has anybody over there done something toward the elimination?

Senator **Kerry**. Yes.

Senator **Chafee**. Have the West Germans done that?

Senator **Kerry**. Let me address that. The Germans were the most dramatic example of steps taken, and they have undertaken a mandate without any Government subsidy whatsoever to require scrubbers on every single polluting company within the country.

I met with the leading industrialists in the country, in Cologne, and listened to them, not only not complain about it, but tell me that without any subsidy, without any tax deduction, without any kind of Government grant, they were individually going to capitalize the cost of that pollution mitigation themselves and that not only would they meet the mandated schedule, which was a 10-year period, but they would beat it. They said so proudly.

I said, "Why?" They said, "Because it is destroying our country."

Senator **Chafee**. One of the arguments we are going to hear is—and we have heard it in the past and I suspect we will hear it in the future—"Well, coal or the utility generators are a factor, but there are a lot of other factors, the automobiles." Now, what did the Germans say about that?

Senator **Kerry**. That is one of the big reasons that they had a struggle over the speed limit there. They are deeply concerned about the NO_x question, and they are moving as the European Community to require emissions standards which will meet the United States emission standards. So, they clearly recognize the NO_x problem and they are taking steps to deal with the NO_x problem.

I have recommended in my bill that we also deal with the NO_x problem with a reduction requirement of 3 million tons of NO_x with the ability to trade NO_x for SO_x, so that you are again allowing flexibility: If some States can do better with respect to NO_x, let them; if others can do better on SO_2, as long as they're meeting an ambient standard.

But they are moving to do that in Europe.

Senator CHAFEE. Thank you.

Thank you very much, Mr. Chairman.

Senator STAFFORD. Thank you very much, Senator Chafee.

Senator KERRY. Thank you very much.

Senator STAFFORD. Thank you very much, Senator Kerry.

The committee will now hear a panel of witnesses, and I will read the names of the panelists and ask if they would come forward to the witness table, please: Mr. Thomas Kuhn, who is executive vice president, Edison Electric Institute, accompanied by Mr. T.J. Glauthier, who is a vice president of Temple, Barker, and Sloane; Ruth Gonze, assistant director of Government Relations, American Public Power Association; Mr. Carl Bagge, president, National Coal Association; Edward H. Pechan, E.H. Pechan and Associates of Springfield, VA; and Mr. Richard Ayres, natural resources defense council, speaking on behalf of the National Clean Air Coalition.

It would be the Chair's intent to hear witnesses in the order in which I called your names. Where you have statements, we will place them all in the record. We do have time constraints we are facing. We need to finish the hearings by 12 o'clock, and they will have to be interrupted, I am sorry to say, by a rollcall vote which could occur at any moment now on a cloture motion in the Senate. So there will be a recess, when the vote starts, for about 15 minutes.

Senator LAUTENBERG. Mr. Chairman.

Senator STAFFORD. Yes, Senator Lautenberg?

Senator LAUTENBERG. If I may for a moment?

Senator STAFFORD. Yes.

Senator LAUTENBERG. I apologize for being a little tardy. I did want to ask unanimous consent that I be permitted to enter an opening statement that I was going to make, into the record.

Senator STAFFORD. Certainly. You certainly may, Senator, indeed.

Senator CHAFEE. Mr. Chairman, I just wanted to welcome several of the witnesses we have seen before. I would like to welcome again Mr. Ayres, and express appreciation to see again Mr. Bagge, who has had a little health problem but I see is back again and looking well. We are delighted to have him back. And, of course, Tom Kuhn, who is executive vice president of the Edison Electric Institute.

We are delighted to see you here, Mr. Kuhn, and the other gentlemen as well. I am not excluding anybody.

Senator MITCHELL. How about the people in the audience?

Senator CHAFEE. Well, I looked around and I didn't see any Rhode Islanders there. But we are very glad they are here.

Senator STAFFORD. Well, gentlemen and lady, we would appreciate it if you could summarize your statements in about 5 minutes.

Mr. KUHN. We will do so, sir.

Senator STAFFORD. All right, sir. Mr. Kuhn, you are the leadoff witness.

STATEMENT OF THOMAS R. KUHN, EXECUTIVE VICE PRESIDENT, EDISON ELECTRIC INSTITUTE, ACCOMPANIED BY T. JAMES GLAUTHIER, VICE PRESIDENT, TEMPLE, BARKER & SLOANE, INC.

Mr. KUHN. Mr. Chairman, members of the committee, good morning. I am Tom Kuhn, executive vice president of the Edison Electric Institute. The Institute is the association of the Nation's investor-owned electric utility companies. Our member companies generate about 75 percent of the electricity used in the Nation, and we serve nearly three-quarters of the country's electric utility customers.

We, too, are very much concerned about the acid rain situation, Mr. Chairman, and we think that contrary to what Senator Kerry says, there is a great deal being done already. We do strongly oppose enactment of S. 2203, because we believe that Congress has already put in place the necessary tools to address the concerns that have been expressed regarding acid rain.

In the first place, the Clean Air Act is working. EPA data shows that in the period from 1973 to 1984 the total sulfur dioxide emissions in this country declined by some 26 percent. During that same period, electric utility emissions declined by some 16 percent, while in fact coal usage in this country increased by some 70 percent. So, I think that is a fairly significant factor.

The EPA reported also that in the period of 1970 to 1981 electric utilities in this country under the Clean Air Act spent some $45 billion; and they further estimated that in the period 1981–90, during this decade, that we will spend more than $95 billion on air pollution control under the Clean Air Act.

I might indicate, when we do make these comments about what we are spending, it is really our electric consumers who are spending this, because we are not here just on the basis of what we are spending. It's the electric consumers of the country that ultimately pay these bills.

Second, just last year the Congress, I think in its infinite wisdom, passed the Clean Coal Technology Program and authorized that program at a level of $750 million. We strongly supported that program. It was strongly supported in the communique between President Reagan and Prime Minister Mulroney as the centerpiece of any acid rain control program. The Department of Energy has moved forward in approving nine demonstration projects, and I really think that this program is a way that we should definitely attack the acid rain situation in the long term because it provides us some cost-effective new generation with greatly reduced emissions.

Finally, in 1980, Senator Moynihan, one of the committee's distinguished members, sponsored legislation which authorized a 10-year program called the National Acid Precipitation Assessment Program [NAPAP] which is underway, and the results are due out in 2 or 3 years. In fact, I understand a preliminary report may be made by its executive director, Dr. Lawrence Culp, at the end of this year.

On this pending research, EPA Administrator Lee Thomas just testified a few months ago before the House and indicated the following:

> We do not believe that the current state of knowledge can sustain any judgment with respect to the level of emission reductions needed to prevent or eliminate damage. We do believe, however, that current research is providing answers to these questions and that we will be empowered with the knowledge to make responsible decisions within a reasonable period of time.

Thus, through the Clean Air Act, the clean coal technology, and judicious research which is nearing completion, we believe that the Congress has already taken those steps necessary to address the concerns currently raised about acid rain.

Senator Burdick made a statement about the Canadians, and I think, Mr. Chairman, that we do look very kindly upon one provision of your bill that calls for treaty negotiations between the United States and Canada, because again we would like to indicate to you just how much is already going on in this country. We produced a map here [indicating] that shows scrubbers in the United States, and as you can see, the map indicates there is significant activity in this country. Already we have some 126 operating scrubbers, another 30 under construction, and another 58 planned, for a total of more than 200.

Similarly, a map of Canada, as Senator Burdick indicated, shows absolutely no scrubbers whatsoever.

So we are not ignoring the situation We do have a great deal of activity underway, and the programs that the Congress has already enacted and that the EPA is undertaking are going a long way in addressing the problem.

Today, we would like to concentrate our testimony, given the extremely limited time, on the costs that would be incurred by our electricity customers if S. 2203 were adopted. We contracted with the internationally recognized consulting firm of Temple, Barker, & Sloane, whose headquarters is in Lexington, MA. We gave them full carte blanche to consult with whomever they deemed appropriate, to make their own assumptions, and we placed no constraints on their methodology or assumptions. So, the report, I believe contains no utility industry preconceptions or biases.

I would like to introduce T.J. Glauthier, vice president of Temple, Barker & Sloane, who will present his firm's analysis of S. 2203.

STATEMENT OF T. JAMES GLAUTHIER, VICE PRESIDENT, TEMPLE, BARKER & SLOANE, INC.

Mr. GLAUTHIER. Mr. Chairman, members of the committee, thank you for inviting me to appear here today. I am T.J. Glauthier, a vice president of the consulting firm Temple, Barker & Sloane, headquartered in Lexington, MA. I am responsible for the economic analyses that our firm has done over the years for the electric utility industry, recently on this bill, and covering other bills in the past. I welcome the opportunity to share with you today the results of an analysis we have just completed regarding the economic effects of this bill, S. 2203, and the effects that this bill would have on utilities and their ratepayers.

In my oral remarks I will summarize a few of our major conclusions. I have submitted full copies of the report to you along with my testimony, and ask that the full report be placed into the hearing record. [See p. 84.]

Senator **Stafford**. Without objection, it will be.

Mr. **Glauthier**. Recognizing the uncertainty that exists with regard to the key assumptions that must be made in analyzing this bill, we have developed two cases or scenarios which cover a range of values for several of these factors. The results from both of these cases clearly demonstrate that this is a very ambitious and expensive proposal.

With regard to emissions, it would achieve a sulfur dioxide reduction of from 12.3 to 13.5 million tons long term, with a reduction of 11.6 to 13.1 million tons in the mid-1990's. It would also achieve nitrogen oxide reductions, but we haven't estimated that amount.

The bill would achieve these results by requiring changes at 83 percent of the coal-fired capacity in the country. Technological controls, scrubbers, or advanced technologies, would ultimately be required at over 900 coal-fired generating plants—generating units—in the utility industry, totaling 230 million kilowatts of capacity.

Turning to costs, this bill would require utility customers to pay $10.8 billion to $15.4 billion a year on a 20-year levelized basis. This is about two to three times the $5 billion a year we estimated that H.R. 4567 would cost. The sulfur dioxide requirements of the bill would account for between $7.3 billion and $8.3 billion of that annual total. The nitrogen oxide provisions would account for the other $3.5 billion to $7.1 billion.

The capital requirements of the bill are also very large. Our estimate is that from $51 billion to $71 billion would be required for the capital expenditures on scrubbers, innovative technology, and NO_x controls under this bill.

All of these costs ultimately get paid by utility customers through their electricity bills. Customer rates for electricity would increase significantly in many States. Our estimates are that rates would increase in the mid-1990's by 10 percent or more in from 8 to 24 States, even based on 20-year levelized costs. The rate increases would be higher in the peak years, of course, and would vary at individual utilities, with some lower than the average and some higher.

Finally, I would like to comment on the estimated effect of this bill on the implementation of innovative and advanced emissions control technologies. If the new source performance standards provisions of this bill were standing alone, with units affected over time as they reached 35 years of age, then innovative and advanced technologies would play a significant role, accounting for 70 to 105 million kilowatts, or 30 to 40 percent, of the retrofitted capacity. However, the earlier restrictions in this bill on operating hours would result in many units being scrubbed in the early 1990's before these innovative technologies would be available on a wide scale.

As a result, our estimate is that approximately two-thirds of the potential use of innovative technologies would be lost, with only 23 to 38 million kilowatts actually retrofitted.

Thank you, Mr. Chairman. I would be happy to answer any questions that you or other members of the committee may have.

Senator **Stafford**. Thank you very much, Mr. Glauthier. I think we will reserve questions until all of the panel have had a chance to make their presentations.

It would be the Chair's intent to continue to second bells and then recess the committee until we can go and vote. So, Ms. Gonze, I guess you are next on the list, and we have about 5 minutes, I would estimate, before we will have to break.

STATEMENT OF RUTH GONZE, ASSISTANT DIRECTOR OF GOVERNMENT RELATIONS, AMERICAN PUBLIC POWER ASSOCIATION

Ms. **Gonze**. Thank you, Mr. Stafford. My name is Ruth Gonze. I represent the American Public Power Association. APPA is the national association of about 1,750 local publicly owned electric utilities all over the country. I have testified before this committee on previous occasions as to APPA's support for national acid rain control legislation. Our members are willing to pay their fair share of costs, and that share would be quite significant, since about two-thirds of the kilowatthours sold by public power systems is derived from fossil fuels.

But we represent millions of consumers, and we see ourselves as having a dual responsibility: first, to represent their support on acid rain; second, to represent their wish not to spend a dollar more than we have to spend and their wish that the dollars we spend are fairly apportioned.

So, in trying to meet those obligations, we came to the conclusion in 1983 that the interest of consumers in both a clean environment and in reliable electric power at reasonable cost could be best achieved through the adoption of certain principles: first, that the program should include national cost sharing, a funding mechanism based on emissions fees applied to all SO_2 and NO_x emissions for which a fee is feasible;

Second, that money raised through such fees should be used to fund the most cost-effective and verifiable emission reduction measures that are available, specifically including fuel switching and scrubber systems.

I would like to note that APPA has hundreds of member utilities in the western United States. They have agreed to pay their share based on their emissions. As far as I know, this may be the only western industrial group in the country that has achieved such an agreement. I thus commend these principles to the committee as holding the potential for interregional agreement on the issue of cost sharing.

But in light of these principles, I am sorry to say that APPA cannot support the enactment of S. 2203. According to the Congressional Budget Office, the cost would be two to three times as much as other legislation would cost.

Senator Proxmire this morning cited an ICF study indicating a $12 billion annual SO_2 cost and a $10.4 billion NO_x cost. That is very high. While extracting these billions of extra dollars, it would give in return only about 2 million additional tons of emission reduction than other programs would give.

The bulk of that cost would be borne by the people of a relatively small number of States. We think any acid rain control measure should include national cost sharing. But the need to spread the cost is all the greater when you prescribe the sort of drastic expenditures envisioned by S. 2203.

Section 129(a) of the bill would take out of service a year and a half after December 31, 1991, every baseload plant that does not attain an emission rate of 0.7 pounds of SO_2 per MBTU. To meet that rate, it seems that just about every existing plant in the country must install scrubbers, including, for example, small peakload plants for which the costs per kilowatt are prohibitive and for which the costs would immediately force shutdown.

S. 2203's requirement that plants older than 35 years be deemed new sources would effectively require scrubbers on old plants one year and 3,000 hours before the other plants. If the objective is to force the retirement of those plants, the environment gains nothing.

It is true that the place where the stock of existing plants is older and more costly to retrofit is the Midwest. Now, one of the things—there is good reason why fewer new generating plants have been built in the Midwest than in other places. Not only is the local coal high in sulfur and utilities have depended on it, but also the Midwest, as the members of the committee know, has not shared in the economic growth of other regions in recent decades. These States are already hard pressed. It is not fair, and it is not acceptable to APPA, to impose on these States devastatingly high expenses not essential to achieve substantial emission cuts and then to add to that misery a national refusal to share the burden of cost for a national goal.

With respect to S. 2813, the Proxmire-Humphrey bill, APPA was informed only on Monday that the committee would consider testimony on legislation other than S. 2203. Unfortunately, as a result, we have not had enough time to analyze the bill. Our preliminary reaction is that it contains a number of rather good provisions and that it would be likely to cost a lot less per pound of emission reduction than a lot of other bills. It also has some drawbacks.

One of the things we like about it is that it provides a lot of flexibility in the details of implementation. Flexibility is a word that sounds opaque in a way. It is not immediately clear what it means or why it's important. But it is very important, because the optimal allocation of emission control investments requires a detailed analysis which should consider factors like plant size, like hours of operation, and like fuel-switching opportunities, that are simply too intricate to express in a statute but are critical in ensuring that the dollar investment is effectively used.

Second, the bill would provide that conservation may be used to cut emissions. Obviously, conservation is an important option because the desired end result is less acid deposition and not any particular ratio of emissions to fuel input. Emission cuts through conservation are the best of all possible worlds, and if we can do it that way, we should.

We have reservations about the bill's failure to include a national cost-sharing provision. We have further reservations about certain aspects of the unit-by-unit default provision in the bill, and we would like to avail ourselves of the opportunity to submit further comments for the record on this and other questions when we have examined the bill more closely.

I appreciate the opportunity to testify today.

Senator STAFFORD. Thank you very much.

We will now have to recess so that members can vote. We will return as speedily as we can.

[Recess taken.]

Senator STAFFORD. We are going to ask the meeting to come to order so that we may proceed, since we are still looking at a deadline of 12:00.

Senator Mitchell, you asked for recognition?

Senator MITCHELL. I did, Mr. Chairman.

Mr. Chairman, I apologize to those witnesses who have not yet had an opportunity to testify. I do have to leave for another meeting, and the vote has caused a delay in these proceedings, and so I would like just to thank all the witnesses and say that I will look forward to working with them in trying to resolve this serious problem.

Thank you all for coming this morning.

I apologize, Mr. Chairman.

Senator STAFFORD. Thank you, Senator Mitchell. We understand how busy you are. We are all pretty much in the same boat.

The next witness would be Mr. Carl Bagge.

Carl, you have been here before. I understand you had a little illness. I am glad to see you are looking much better than I am feeling, and I welcome you here this morning.

STATEMENT OF CARL BAGGE, PRESIDENT, NATIONAL COAL ASSOCIATION

Mr. BAGGE. Thank you very much, Mr. Chairman. My name is Carl Bagge. I am president of the National Coal Association. I want to make this point: that the National Coal Association represents producers of coal both east and west, both low- and high-sulfur coal. We have been able to keep the coal industry together, notwithstanding this crisis—the perceived crisis—in the acid rain controversy that rages and has raged for 4 years or more.

The legislation now before the committee is the first of what should be termed, in my view, third-generation acid rain control bills. This is indeed a third generation if you look at it conceptually and through this history of this national dialog. In each generation the connection to acid rain has become weaker, and the main objective, more stringent SO_2 controls on non-NSPS powerplants, has become stronger because this is indeed, as we see it—we don't have a conspiratorial view yet of the universe around us—but we think this is the underlying objective of all this legislation.

The first-generation bills, such as S. 768 and H.R. 3400, considered in the last Congress, called for a reduction in aggregate SO_2 emissions of between 8 to 12 million tons. These reductions were apportioned among the States in a manner allegedly related to the State's relative contributions to the acid rain phenomenon.

Upon examination, however, it became evident that the required reductions were determined by the extent to which non-NSPS, or SIP-controlled plants, exceed 1.2 pounds SO_2 per million Btu, not by the extent of the State's contribution to the observed effects of acidity.

As we stated at the time, and as I testified before you at the time and before the House, this was a thinly disguised attempt to impose a nationwide limit on SO_2 emissions from SIP-controlled plants which were otherwise in full compliance with all of the requirements of the Clean Air Act and constituted no threat either to the public health or the welfare, as defined by the Clean Air Act.

The second-generation bills are exemplified by H.R. 4567, currently before the House Energy and Commerce Committee, and S. 2813, the Proxmire-Humphrey bill. These are still labeled acid rain control bills, but there is no attempt to hide the imposition of more stringent controls on SIP-controlled powerplants. All States must meet an average of 2 pounds per million Btu limit by 1992 and a 1.2 pound Btu limit by 1997. This can be accomplished only by significantly reducing SO_2 emissions at non-NSPS powerplants. The effect would be an 8-to-10-million-ton aggregate SO_2 emission reduction.

The Stafford bill, S. 2203, represents still another, and third approach, as we see it. The title is bold. It is indeed a bold title, "The New Clean Air Act." A bold title, because that is precisely what it is. Acid rain control, the driving force for amendment of the Clean Air Act in the last of this Congress is relegated to one of the many multiple purposes of the act. The future of SIP-controlled non-NSPS plants is brutally clear: They will cease to exist in 1992. They will cease to exist in 1992. All plants will adopt NSPS controls or attain equivalent emission levels, or they will be retired quickly.

Thus, the generic label that we—I hope you don't regard it as presumptuous of me to say—control or retire characterizes this proposal. We can now expect a spate of new studies, all attempting to quantify the costs and effects of this proposal.

The latest approach, like its predecessors, is a proposal to impose a nationwide limit on emissions of SO_2 from sources not subject to new source performance standards without regard to whether such limit is required to protect public health or without regard to whether it's required to protect the welfare, as we define it in the Clean Air Act. When all the new studies are completed, the proposed new approach and the resulting reduction in aggregate SO_2 emissions will be shown to be costly and will have little effect on the localized and limited instances of ecological distress which are the supposed beneficiaries of this or other legislation proposed to control acid rain by further reducing SO_2 emissions.

This legislation and the predecessors appear to be motivated, in part, by a perception—and it is probably held in good faith by those of you proposing it—that the Clean Air Act is not working or has ceased to be effective and that absent additional controls such as those proposed by S. 2203 or S. 2813, emissions of SO_2 will rise.

There has to be some assumption underlying all of this hysteria in the national debate that SO_2 emissions are rising, and we respectfully disagree with this. We can prove, and we have established to the satisfaction of even EPA that SO_2 emissions have declined substantially, the Clean Air Act is working, and in fact through the year 1985, for which there is the latest data, EPA has now revised its estimates, based on our work, and conceded in a letter that I hope to introduce here into the record, EPA now admits that SO_2 emissions have continued to decline substantially through this entire period since the enactment of the act right after 1970 and that in fact the air in terms of SO_2 is getting cleaner.

Earlier this year, NCA completed a detailed analysis and study of SO_2 emissions from coal-fired power plants—from 1980 to 1985—and although EPA admitted that SO_2 emissions are declining, they said from 1980 their projections showed that they will be increasing and will be increasing through the 1990's and beyond.

Our friends at EPRI, the research arm of the utility industry, in Palo Alto, CA, did some work that showed SO_2 emissions are going to decline farther out in time, but we were faced with the political problem of coping with the 1980-85 to 1990 timeframe because that assumption is motivating all this legislation. But the fact is that SO_2 emissions are declining, for a number of different reasons.

Contrary to the conventional wisdom and contrary to the work done by the beltway bandits, who do the real work for EPA, we took them on. We even took on our friends at EPRI. Our friends at EPRI, had assumed in their work that the EPA had been correct—and based their assumptions, their longer term analysis based on what EPA was saying.

So, the little old National Coal Association took on not only EPA, the Federal Government, but even indeed our own friends at EPRI in Palo Alto, who have got a lot more bucks than we have to do the kind of analytical work that had to be done in this area to come down to determing whether SO_2 emissions are rising or declining, because unless you conclude that they're rising and you can prove it, there is no need for all this legislation because then the Clean Air Act is working. That is the basic premise underlying our motivation to do the work.

I have a copy of the study here. We have tried, Mr. Chairman, to present this to the staff, your staff, and the members of the committee. We haven't had that opportunity accorded to us. I would like, if I can, to introduce our study into the record at this time.

Senator STAFFORD. Carl, without objection, that will be made a part of the record. [See p. 124.]

Mr. BAGGE. Thank you very much.

Senator STAFFORD. Could you summarize now in a minute or so?

Mr. BAGGE. Sure. I will summarize. In fact, I will summarize right now by saying that I have only got six pages here and I was just getting to the heart of my issue. The heart of my message is that SO_2 emissions are declining. We have a letter also from Dr. Milt Russell, the Assistant Administrator for Policy Planning and Analysis of EPA, confirming that they were wrong and we are right and their consultant ICF, who are the beltway bandits doing the work, for EPA. A copy of their study is attached and we would like to introduce it into the record, too, if we can. [See p. 142.]

They have conceded that we are right and that they are wrong, and our friends, the peer review we had at EPRI in Palo Alto, they conceded we're right, so we're saying we're right.

I have also got, if you don't mind, I had a speech to the Southern Governors a few months ago, and I am very pleased, Mr. Chairman, that it made Vital Speeches on the economics of acid rain. If it isn't presumptuous of me, I would like to have you read my speech. I would like to get you to read it because it made the Vital Speeches.

It is the best thing I have seen, although I say modestly it's my own speech.

But it's the best thing I have seen on the economics, on the economics of acid rain. I would like to put it in the record if I can. I have 100 copies here with me, and I hope you fellows get a chance to read it.

With that, I would like to summarize and say God bless you, and I hope you don't pass this bill.

Senator Stafford. Well, thank you very much.

Mr. Bagge. Thank you.

Senator Stafford. The next witness will be Mr. Edward Pechan, of E.H. Pechan & Associates, of Springfield, VA.

Mr. Pechan.

STATEMENT OF EDWARD H. PECHAN, E.H. PECHAN & ASSOCIATES, INC.

Mr. Pechan. Thank you, Mr. Chairman. My name is Edward Pechan. I am President of E.H. Pechan & Associates, Inc., a research and consulting firm with offices in Springfield, VA, and Durham, NC.

For the past 5 years my firm has been conducting a variety of analyses related to the acid deposition issue for both public and private sector sponsors. Today I would like to discuss some of my firm's work in estimating coal resources and reserves. The availability of coals of specific types can have a significant impact on the methods industry uses to meet environmental standards as well as on their costs and other economic effects. These issues are of concern to the alternative legislative proposals that are being considered to address acid deposition.

I would like to focus my remarks on three topics: The extent and location of coal resources that could meet an annual emissions standard of 0.7 pounds of sulfur dioxide emitted per million Btu of heat input, as well as other numeric standards; the limitations of the information used to generate the results; and an outline of some other issues that influence the use of coals of various types.

Senator Chafee [presiding]. Well, now, that's a big menu and you have only got 5 minutes, so you use it how you want.

Mr. Pechan. Yes. I have a written statement which I would like to put in the record.

Senator Chafee. Surely.

Mr. Pechan. I just planned to summarize this in my oral testimony.

Senator CHAFEE. Fine.

Mr. PECHAN. Results from our analysis show that from approximately 100 to 170 billion tons of coal will meet a 0.7 pounds of SO_2 per million Btu annual standard out of a total resource base of from 460 to 750 billion tons. To compare that with current consumption, the depletion of the resource base from current consumption is about 1.5 billion tons per year. So, you can see that there is a substantial quantity.

In 1985, about 9 percent, or approximately 63 million tons, of coal delivered to electric utilities in the United States could meet the 0.7 pound standard. Now, one of the important things that our analysis incorporated was a factor called ash retention, and that factor accounts for the fact that only from 75 to 97.5 percent of the sulfur present in coal is emitted to the atmosphere when the coal is burned. In particular, for subbituminous coals, the vast majority of the coals that fall into this low, extremely low-sulfur category, the amount of the sulfur which is retained in the ash and not emitted is about 12.5 percent. So, you have billions of tons of coals in places like Wyoming and Montana that are very close to this 0.7 pound limit, but when you factor in that 12.5 percent that is not emitted into the atmosphere, that puts a tremendous amount of coal into that category.

In my written testimony I have indicated some other materials. We have compared our findings with data from other sources such as the Keystone Coal Manual, a standard reference for the coal industry, and we find that our results are in agreement within the range of uncertainty.

Of the 63 million tons that was delivered to utilities in 1985 that would meet a 0.7 pound standard, Colorado accounted for about 5 million tons, Montana was about 7.5 million, Utah 2.3 million tons, and Wyoming 47 million tons. In the table that accompanies my testimony it is shown that those in fact are the States that we have identified as having significant quantities of coal that could meet the standard.

Now, I do want just very briefly to point out the fact—and again, it is clarified in my written material—that there are a number of issues with regard to the data that supported this. I go through those in more detail in the written submission along with a number of things that we were not able to look at.

Another set of issues that relates to how this coal could be used or how quickly it could be used relate to the availability of the coal; in other words, does it underlie streams and can't be mined? Some of it will be. Some of it might be in national parklands. Some of it might be in areas under the control of Indian tribes or States that may not wish to develop that coal.

Recoverability, which is the amount of coal that is in the ground—which is what we estimated—that can actually be mined and utilized is another issue. Transportation, the availability of transportation facilities. And also, with regard to use of coals in existing boilers, there are some characteristics of the coals that may make it costly or impossible to use it in boilers of certain types.

I just wanted to identify those as some issues, some other issues that we did not look at in detail in the work that we have done on this to date.

Nevertheless, our conclusions are that there is a substantial quantity of this extremely low-sulfur coal that exists in the ground in the United States. Based on comparisons with other studies, we feel that our conclusions are defendable.

Our estimates, we do agree that they are initial estimates. We think that some more focused study could be done to clarify them and make them more precise. Nevertheless, we do not feel that they would alter our basic findings.

Thank you, Mr. Chairman.

Senator STAFFORD [presiding]. Thank you very much, Mr. Pechan. We will study your statement with care.

The final witness this morning, again no stranger to this committee, is Mr. Richard Ayres, from the Natural Resources Defense Council.

STATEMENT OF RICHARD E. AYRES, NATURAL RESOURCES DEFENSE COUNCIL, ON BEHALF OF NATIONAL CLEAN AIR COALITION

Mr. AYRES. Thank you, Mr. Chairman. I want to thank you and the other members of the committee for inviting us to testify here this morning.

Mr. Chairman, these hearings come at the end of the current session of Congress, but in our mind that makes them no less urgent. It is time to renew, revise, and strengthen the Clean Air Act. Public health and the public welfare demand it.

For the past 6 years we have seen a stalemate in Congress while the Environmental Protection Agency has raised inaction to an art form. With EPA dead in the water, the victims of air pollution have turned to Congress for leadership. S. 2203 is an excellent example of that leadership and how it can be applied.

Yet, everyone else at this table this morning, with the exception of Mr. Pechan, will oppose S. 2203. Everyone will say the symptoms are illusory or the evidence is uncertain or the cause is unclear or another industry is the cause or the status quo is acceptable or that the costs of control are too great. Everyone, in short, will ask you to do nothing.

I believe the costs of doing nothing, Mr. Chairman is the unacceptable cost. What we should be debating today is not whether S. 2203 is too ambitious but whether it is too moderate. It sets pollution standards at levels already being met or exceeded in practice in today's economy with today's supplies of coal by today's motor vehicles.

The refreshing thing about S. 2203, Mr. Chairman, is its approach. It renews the promise of the Clean Air Act and reaffirms its intent. It is clear, direct, and simple. Tax simplification is in vogue today, Mr. Chairman. What you have proposed is a kind of pollution control simplification. This bill simply says all powerplants must eventually meet a responsible standard of pollution control and it sets a reasonable timetable for achieving that job—which extends into the next century, by the way. This bill says that all industrial boilers must eventually meet a responsible standard, all trucks, buses, and diesel engines, and in the case of passenger cars it says what the Clean Air Act has always said: that all cars should strive to keep up with the leaders in pollution control. I do not regard that as immoderate, Mr. Chairman.

The greatest success story of the Clean Air Act to date has been reducing pollution from automobiles. I believe this progress was achieved because Congress set an ambitious standard and held the auto industry to it.

In the case of sulfur dioxide pollution from powerplants, Congress set less ambitious requirements. The result is that, instead of being cleaned up, enormous powerplants continue to operate with no sulfur oxide controls at all, but with taller and taller smokestacks designed to export pollution far from the sight and thus avoid local challenge.

Ironically, then, as our cars got cleaner in the 1970's, our powerplants were getting bigger and staying dirty. Meanwhile, Japan has been proving the needed technologies and readying them for our market. Yet, the leaders of the utility industry will ask you to do nothing. I wish one would come forward today and say, "This is what we can do. This is the way we can do it at least cost. This is when we can finish the job."

But none of them will. In fact, the Edison Electric Institute is circulating a new brochure on acid rain. Mr. Chairman, I would like to share that with you this morning. I don't know whether those have gotten passed out or not yet. But this is what it looks like [indicating]. I would ask you to look at the first page here at this illustration because if you did as a casual reader I think you might get the impression that volcanos, geysers, lightning storms, farming, bacterial activity and sea spray, et cetera, were all the real sources of most concern, while the utility industry, "thank goodness, is a declining problem."

Mr. Chairman, I want to say a few words about another bill, S. 2813, the Proxmire bill. It is presented as a regional response to controlling acid rain pollutants. The bill makes no attempt to address the broader problem of air pollution control and thus, I think, falls short of the mark.

But it is, in my view, an inadequate response to acid rain as well. In the first place, acid rain is a national problem that demands a national solution. S. 2813 would limit the control program to the 31 Eastern States, ignoring what we have learned about acid rain in the West in the last few years. The bill also ignores the contribution of mobile sources to acid rain, an oversight that will have its greatest impact, again, in the West.

The bill invites bureaucratic delay at the State and national level and, by enshrining a two-step control process, the bill invites the affected industries to lobby EPA and then Congress over the next 6 years rather than concentrating on getting the job done.

Some may see this regional approach as offering the best of both worlds for the West: no local cleanup requirements, new markets for western coal. I think that would be misleading to believe. I believe that if this bill were enacted, it would create a boom-and-bust cycle in western mines, as many powerplants switched to low-sulfur fuel for the first phase and then back to local coal and scrubbers when the second phase came along.

Mr. Chairman, 6 years of inaction have created a long agenda of urgent air pollution problems. With many areas still not meeting health standards, Congress must when it returns establish deadlines and mandate additional controls to achieve those standards. Deadlines provide a means for citizens to hold their Government accountable, and EPA seems unwilling to require new ozone controls unless specifically instructed by Congress.

Congress must also make attainment of those air quality standards an urgent priority. Congress must also respond to acid rain and the threat to our stratosphere, too. Congress must put an end to EPA's inaction on toxic air pollutants. For years, EPA has promised to regulate toxic air pollutants. Every promise, including that made by Administrator Ruckleshaus in 1983, has been broken.

The current system for toxic air pollution control allows industrial plants to avoid control costs, shifting the burden to the public downwind based on nothing more than crystal-ball health effects assumptions entered into EPA computers. Meanwhile, EPA marches in ever smaller circles in search of the exact balance between excess deaths and estimated control costs. We think it's time Congress broke that circle and got something done about this issue.

In S. 2203, the committee has proposed an important first step toward revitalizing our Nation's slumbering air pollution control program. I urge you to move quickly on this bill and continue this welcome trend when you return in January. Thank you, Mr. Chairman, and members of the committee.

Senator STAFFORD. Thank you very much, Mr. Ayres.

We do have a minute or two for questions. Mr. Kuhn, let me address a question to you. The analysis of S. 2203 undertaken for the Edison Electric Institute assumes a powerplant lifetime of 50 or 60 years. This lifetime is a variance from data supplied to the committee in the past. When Kathleen Bennett, then Assistant Administrator of EPA for Air, Noise, and Radiation, provided information to the committee and its staff, she assumed a 30- or 35-year lifetime. In 1983, when the committee requested lifetime information from a number of individual companies, the average lifetime which they reported was about 38 years.

In view of the importance of this subject, could you survey each of your member companies and then consider providing the committee with a list of every major unit and each company's projection for the lifetime of that unit? We would appreciate that information. Could you make it available to us by December 1?

Mr. KUHN. We will do the survey as you request, sir.[1]

Senator STAFFORD. In view of the fact most of our members have had to run to other committees, I am going to reserve the right to all committee members to submit questions in writing if they wish. We will ask for your response at your earliest convenience.

Senator Chafee, do you have any questions?

Senator CHAFEE. I would like to ask Mr. Bagge if he has any comments on the testimony of Mr. Pechan, which basically was that if the question is supply——

Mr. BAGGE. You mean this gentleman here?

Senator CHAFEE. That's right.

Mr. BAGGE. What he said?

Senator CHAFEE. That's right.

Mr. BAGGE. All I know, based on my experience with that particular issue, Senator Chafee, is that the U.S.G.S. some years ago was saying the very same thing, when there was a proposal, it wasn't the acid rain issue then, it was a proposal by EPA, under the Carter administration, to ratchet down the SO_2 standards from 1.2 pounds per million BTU average down to 0.55.

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[1] The information requested has been received and is retained in committee files.

At that time, the rationale by the U.S.G.S. was that it could be easily accommodated because of the amount of low-sulfur coal available in this country.

Now, we on the other hand who deal with operators in the real world, not on some theoretical U.S.G.S. study, where you may have a coal seam that's 5 inches or 6 inches thick, had to go to our member companies, look at their inventory on the shelf for the next 50 years. I am talking about real, honest-to-God coal companies who pay dues to my association, to say, "Tell us what is your sulphur content from the core samples, the core samples in your reserves?"

Now, once we found that out, it was in sharp contrast to this theoretical projection of low-sulfur coal reserves in this country, and I had to go to then-majority leader of the Senate on bended knees to plead with him that his administration was going to shut down the coal industry in West Virginia, in half of Pennsylvania, in all of Ohio, in Illinois, Indiana, and Kentucky because it simply wasn't in the real world. It bore no relationship.

Now, I am not going to argue with this gentleman. He may be right. I am just saying that based on my own experience, when you look at the inventory of the coal industry as an aggregate, you couldn't possibly ratchet down to 0.55, as the administration under Doug Costle attempted to do, and but for the grace of God and Senator Byrd we would be living under that today with an emasculated coal industry in the United States.

Senator CHAFEE. Well, I have your answer.

Now, Mr. Pechan, you heard Mr. Bagge's comments. You say in your testimony, as I recall it, that there is a 75-to-100-years' supply in the United States of coal that meets these lower sulfur requirements. Now you have heard what he said; It may be there, but it's not attainable in the inventory of the companies that are doing it. What do you say to that?

Mr. PECHAN. What I said may not be in disagreement with what he is saying, since he is looking at current mines and what their projections are, and certainly if you look at our data on which States have significant resources in this 0.7 category—and you see, Mr. Bagge, also—that there are not any Eastern States there. Now, we did an analysis for 1.2, and there are some Eastern States there, foremost among them Kentucky and West Virginia.

Senator CHAFEE. That is the 1.2. Your charts show that the coal is there but is it accessible, is it economically produceable?

Mr. PECHAN. Oh, with regard to economics, yes, we limited the analysis to only coal that would be recoverable economically under current conditions. So for deep mines we were looking at seams only greater than 28 inches; for strip mine only seams, I think, above 5 feet; overall, all of which met the recoverability criteria that the Department of Energy uses in its Demonstrated Reserve Base, which are very stringent criteria.

Senator CHAFEE. All right. Now, my next question was of Mr. Kuhn.

You heard what Mr. Ayres said, and he took to task your brochure. What do you think are the major causes of SO_2 in the United States that could affect acid rain, outside of your plants? What else? Automobiles have been identified.

Mr. KUHN. Senator, I think that there are many different sources, as Mr. Ayres indicated himself, that have been identified, and that is just our point: that the causes of acid rain still are undergoing study. There is a significant amount of research that is going on in this area, including Senator Moynihan's own study, the NAPAP program—National Acid Precipitation Assessment Program—that is still underway and has a couple of years to go.

We really need to nail down those causes and, once you nail down those causes, find out what the effects are. Once you have established those cause-and-effect relationships, you can really concentrate your money and your resources in areas that can produce results, so that consumers don't have to pay perhaps billions of dollars unnecessarily.

We really think that that research needs to be finished. It is underway and is fairly close to being completed at this point in time.

Senator CHAFEE. I might have some questions later. I have used my time up.

Senator STAFFORD. All right. Thank you, Senator Chafee.

For reasons which bemuse me, I see we have another live quorum started, but notwithstanding that, Senator Baucus, the floor is yours.

Senator BAUCUS. I thank the chairman.

I would like to know from Mr. Bagge or Mr. Kuhn, what are the most promising new technologies to help meet the highest possible standards? If you look at the research in your industry, which of the present technologies and, more particularly the newer technologies, are the most promising to help us meet these tougher standards?

Mr. BAGGE. Well, I would like to respond for just a minute if I can and then let Tom do it.

What we have done as a society, and implemented in just this last year by this Congress, was to commit $400 million to taking our country into a plan for clean coal technology. Now, there is a whole multitude of various technologies.

Senator BAUCUS. What are they?

Mr. BAGGE. Pressurized fluidized bed.

Senator BAUCUS. That is one.

Mr. BAGGE. Atmospheric fluidized bed.

Senator BAUCUS. What else?

Mr. BAGGE. There are a whole range of other technologies that deal with combustion. We have been treating this problem after the combustion cycle. I mean, that is what I think is the archaic scrubber. The scrubber that we use today is really an anachronism. I mean, it was a very primitive thing to begin with. We had trouble making it work.

But now, the new technologies look at the process of combustion. In Dagat, CA, I have been out and seen the plant there that the Southern CA Edison has, which takes a whole range of sulfur coals and transforms it into a low-BTU gas which has been proven economic.

So, gasification, as we thought of it in the past, that may have been very expensive, is proving itself in Dagat, CA, in the cool water plant. There are a number of other technologies that I am not competent to describe to you.

But the point I am trying to make is that this very Congress, over the protests of the administration and the OMB, has committed $400 million to a program of trying to accelerate clean coal technology.

Senator BAUCUS. Today, which technologies are the most promising? That is my question.

Mr. BAGGE. OK.

Senator BAUCUS. What is the most promising today?

Mr. BAGGE. Well, I am not qualified to tell you, Senator.

Senator BAUCUS. Mr. Kuhn, do you have any comment?

Mr. BAGGE. I would say the cool water, in my opinion, is the most promising.

Senator BAUCUS. Does anybody here have——

Mr. AYRES. Senator Baucus, could I address that question?

Senator BAUCUS. Yes.

Mr. AYRES. I think what you are hearing here is very analogous to what the Congress heard in 1967, if I may go back that far. If you look at the testimony before this committee in that year, you will find the utility industry came in and said, "We don't want to be asked to reduce SO_2 emissions now, because we have a new technology just over the horizon that will do this job. It's called scrubber. Now that's not OK, and the two technologies you get whenever you ask the question you did are the two that you have heard: fluidized bed and the gasification technology at cool water.

Now, the DOE has made contract grants for the development of these technologies under this clean coal technology program very recently, and what they have done for these technologies is give grants for commercial-size demonstrations which are to be completed by 1991.

So, I think this argument that we have to wait around for the development of new technologies is, frankly, a lot of baloney.

Senator BAUCUS. OK. Next question is——

Mr. KUNN. Senator, may I have one chance to answer that?

Senator BAUCUS. Yes.

Mr. KUNN. I think that the technologies that have been mentioned—the integrated gasification combined cycle plant and the fluidized bed combustion plants—certainly do give us a lot of promise. The cool water plant in southern California is an extremely successful plant.

I would welcome the opportunity to set up a tour of these facilities for the members of this committee—and if the chairman would want us to do that, we would be glad to do that—to take the members of the committee around to show the committee members these technologies, to show what they're accomplishing. I think that since you have authorized the $750 million Clean Coal Technology Program, you can see where these technologies are taking us in terms of really cost-effective plants that do offer substantially lower emissions.

Senator BAUCUS. Next question is: By 1991 or mid-1990's, can the SO_2 standards in this bill be met? Anybody want to take a crack at that? Mr. Ayres?

Mr. AYRES. Senator Baucus, the SO_2 standards——

Senator BAUCUS. Apart from the cost, just can the standards be met with present and new technologies?

Mr. AYRES. As I said in my testimony, the standards in this bill can be met with today's technologies that, as you heard from Mr. Kuhn, are being put in place all over the country.

Senator BAUCUS. That is basically for low-sulfur coal, though.

Mr. AYRES. Low-sulfur coal and scrubbers and coal washing, and in different places, different combinations of those.

Senator BAUCUS. Mr. Bagge, by 1991 can the standards be met?

Mr. BAGGE. I don't know if I know the answer to that, but I know that the real——

Senator BAUCUS. Apart from cost? Apart from cost?

Mr. BAGGE. Apart from the cost, I would say that the SO_2, the study that we looked at, the SO_2 standards are going down, and even if we did nothing with the new technology, we have been achieving as a nation reduced sulfur dioxide emissions at a time that coal increased exponentially, when it was discovered after the Arab oil embargo in 1973. You know, the fact is that——

Senator BAUCUS. I understand that, but I am asking a different question. The question I am asking is: Can the standards be met, say, by 1991 or 1995? That is the question I am asking.

Mr. BAGGE. I don't know the answer to that. You mean irrespective of cost?

Senator BAUCUS. Irrespective of cost.

Mr. BAGGE. I don't know the answer to that.

Mr. GLAUTHIER. If I may, they can be met, but the only way they can be met by an early date like that is through extensive use of the current technologies, of scrubbers. In addition to the kinds of clean coal technologies that were described a moment ago, there are a number of projects underway to find new methods of cleaning the gases after the boiler. The processes—LIMB have been referred to, lime injection multistage burning, and others.

Senator BAUCUS. If some plants meet these standards in this bill, isn't that proof positive that, yes, the standards can be met?

Mr. GLAUTHIER. Yes, they can be, and our analysis showed that the costs of doing that are an issue that ought to be considered. But that can be done.

Senator BAUCUS. All right. Next question, if I might, Mr. Chairman.

Mr. Ayres, you heard Mr. Bagge say that SO_2 emissions are declining. What about that? What is your answer to that?

Mr. AYRES. Well, I have not read the most recent——

Senator BAUCUS. He is basically saying there is no need, because the SO_2 emissions are declining.

Mr. AYRES. I haven't read the most recent exchange of correspondence between EPA and the Coal Association. But I think that the comment, if it's correct that emissions are declining, it is a little bit beside the point. The reason I say that is if the reductions needed to protect the environment are on the order of, let's say, 12 million tons a year in sulfur emissions and the decline that has occurred and is occurring will produce, let's say, 6—make up a number. Then, clearly, something must be done to achieve the 12-million-ton reduction.

Now, I would add one other thing, which is, of course, in this bill as in others, in effect the reductions that have been made, if indeed they have been, are going to receive credit under this bill. If there have been reductions, it will mean there is less to do to meet the requirements of this bill. It will make it less expensive, less difficult to do.

So, I don't think it is really crucial to this debate whether emissions are going down or going up, although up until Mr. Bagge's claim today, my understanding of the back-and-forth between these two is that EPA was taking a different position and expected that emissions would be climbing in the late 1980's and into the 1990's unless further reductions were required.

Senator BAUCUS. Obviously, there are going to be some costs as utilities try to meet these standards and the amount of cost is going to be disputed, it's going to be debated. But if this bill passes, time will tell.

On the other side of the coin the question I have is: What will the costs be of the status quo, as if this bill does not pass, there are no similar bills passed? I mean, there would be costs on that side, too, in terms of health and what-not.

I wonder if Mr. Ayres or anybody on the panel could address the costs on that side of the coin; that is, the cost to society of doing nothing? By doing nothing, I mean, not passing this or any similar bill?

Mr. BAGGE. Well, I would like to take a stab at that. In response to Mr. Ayres, who says that direction of SO_2 emissions is irrelevant, I find that rather outrageous to suggest here before the committee of jurisdiction that whether SO_2 emissions are declining or not is totally irrelevant.

This relates to your cost question, because what we're talking about at the fundamentals here is if we are right—and as to any implication that we are not speaking the truth when I said that EPA has agreed with us, we have a letter here before you introduced in the record—that they changed their estimate of where emissions were going, I would like to clarify that first.

But the fact is that all we're talking about is time. I mean, we're going to get there in time, and I think the fundamental public policy is is it worth the billions of dollars and the dislocation of our economy to achieve what we've already achieved in any event—in any event—by a continuous reduction of SO_2 emissions. I mean, that is the fundamental issue before you and you have to make that value judgment.

But I think that Mr. Ayres, by saying that it is irrelevant, is really an insult to your intelligence and an insult to policy formulation in this country, and I am offended by it.

Senator CHAFEE. These answers have to be a little more brief. We are now in the final part of a vote.

Go ahead, Senator. I had a couple of brief questions.

Senator BAUCUS. The question I asked—namely, what are the impact of the costs of not reducing the emissions—briefly just list some; we don't have time——

Mr. AYRES. I can list them, yes. Sulfur, in the atmosphere, damages human health, causes acid rain which, in turn, damages, as we know, streams, materials, building materials. It is probably implicated in damage to agricultural and forest industries and so forth.

I think if you try to add up the total in dollars, it is very difficult. But I can tell you that EPA made an estimate for some of the impact of these sulfur emissions, about 1979, at somewhere around $5.6 billion per year. Now, if you inflate that to today's dollars, it is approximately $8 billion or $8.5 billion.

I don't think that you can use numbers to really establish the amount of damage done, but I think if you added up all the attempts to do that for all the kinds of effects, you would be able fairly easily to arrive at a dollar figure that was on the order of the cost of the bills that are being considered by this committee and in the House as well.

Senator BAUCUS. I am sorry. I have to go.

Thank you all.

Senator CHAFEE. All right. I want one quick question.

You said, Mr. Ayres, that Japan is forging ahead with technology to reduce emissions. What are they doing?

Mr. AYRES. Well, I was thinking there of the question of nitrogen oxide emission controls, and sulfur oxide to some extent, too, where I think technologically they have moved somewhat ahead of us although we have clearly, I would say, about two generations of scrubbers in operation in the United States. But in nitrogen oxides we only have one State that requires nitrogen oxide controls on large emitters. We may need that in the future.

Senator CHAFEE. All right.

Mr. Kuhn, you said that we're getting there and you point out the expenditures have been made. But first of all, they don't apply—that it's left to the States for the older plants and the newer plants yes, but the newer plants at are at the highest standards, higher than the Stafford bill would seek. What about the older plants? They are blithely emitting at higher levels. What do we do about them?

Mr. KUHN. Senator, I think that is——

Senator CHAFEE. In 14 seconds.

Mr. KUHN. In 14 seconds. I think that is the heart of the debate that Mr. Bagge just raised, which is that sulfur dioxide emissions are going down. Do we want to put extremely expensive scrubbers on these old plants or do we want to move to the new generation of clean coal technology plants that can get us there over a period of time with cost-effective generation that will help keep the costs down for our consumers and help keep the cost down for our industries?

The question here is a matter of the competitiveness of the U.S. economy and jobs for Americans and the costs that the people are going to have to pay for electricity.

Senator CHAFEE. All right. I have just got to call it quits because I don't want to miss this vote.

Thank you all very much for coming.

Mr. AYRES. Senator Chafee, could I just add something?

Senator CHAFEE. In four seconds.

Mr. AYRES. Yes. I just wanted to submit for the record the letters between EPA and the Coal Association on this.

Senator CHAFEE. Yes. [See p. —.]

Thank you all very much. That concludes our hearing.

[Whereupon, at 12:17 p.m., the committee was adjourned.]

[Statements and other material supplied for the record and the bill S. 2203 follow:]

TESTIMONY OF SENATOR WILLIAM PROXMIRE
before the
SENATE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

Mr. Chairman, members of the Committee, I appreciate the opportunity to appear before you this morning to testify in support of S. 2813, a bill I have cosponsored with Senators Humphrey, Simpson, Burdick, D'Amato, Hollings and Boschwitz. This bill enjoys the enthusiastic support of the Alliance for Acid Rain Control, a broad-based bipartisan coalition of 9 Governors, corporate leaders, academicians and public interest group representatives headed by Governor Tony Earl of my state of Wisconsin. The cosponsors of S. 2813 are indebted to the Alliance for its help in developing what we hope will be a pathbreaking bill.

Let me begin by commending the members of this Committee, and in particular Chairman Stafford and Senators Mitchell and Moynihan, for your diligent efforts on the acid rain issue. I share your frustration with the five years of deadlock that have blocked progress on this vitally important legislation. However, I believe the proverbial tide is beginning to turn on acid rain control. The emergence in the House of a broadly supported legislative vehicle, H.R. 4567, has been quite encouraging. S. 2813, parallels H.R. 4567 on most points but eliminates the unnecessary subsidy provisions of the House bill and adds some of the best elements of H.R. 2679, the fine bill introduced lastyear by Representatives Mo Udall and Dick Cheney, and of S. 503 introduced previously by Senator Humphrey and me.

The Committee is currently considering a number of acid rain bills. However,my comments this morning focus on just two of these, S. 281 and S. 2203, the bill co-sponsored by you, Mr. Chairman, as well as a number of the other members of this committee. S. 2203 sets out a very ambitious target for acid rain reduction, a goal toward which we can all strive. It also embodies the critical "polluter pays" principle which I strongly support. Residents of environmentally progressive states which have already made significant efforts to clean up their own emissions should not pay for pollution cleanup in states which have not made similar efforts. Nor is it fair to require payment from western states which have not contributed to the damage to lakes and forests in other parts of the country.

On these two basic principles, achieving a major reduction in sulfur dioxide and nitrogen oxide emissions and relying on a polluter pays approach, S. 2203 and S. 2813 are in agreement. There are a number of other areas, however, where the two bills diverge. The guiding principles in S. 2813 are flexibility, freedom of choice, encouragement of new technologies and protection for consumers. These principles seem less important in S. 2203.

The Phased Approach

The central element of our bill is the two-phased pollution reduction approach with the opportunity for mid-course corrections based on research results. By achieving reductions in two phases, our bill allows the use of least cost methods such as switching to low-sulfur coal and coal washing to achieve the first five million tons of sulfur dioxide reductions. This first round of reductions can be achieved with little disruption to coal markets and at a cost in the range of one billion dollars annually. This is equal to less than a one percent increase in electric utilities' current aggregate annual expenditures.

The flexible phased approach allows time for use of research results produced in the first phase in the shaping of the second phase strategy, rather than locking the program into a one-phase strategy that is far more difficult and far more expensive to alter later. This mid-course correction feature of our bill allows use of the extensive amount of research currently being conducted in the acid rain field. If this research demonstrates for example, an increasingly serious nitrogen oxides problem, the focus of the second phase strategy could be shifted towards NOX controls to a greater degree. In contrast,S. 2203 requires that all reductions be achieved by 1991, in effect blocking any chance for improvements to the control strategy based on new research results.

Encouragement to Clean Coal Technology

Equally important, the phasing approach encourages development of clean coal technologies for meeting the much more costly second five million ton sulfur dioxide emission reduction. Although these technologies promise to provide emission reductions much more cheaply than existing technology, they will not be commerically available until as late as 1992 according to the Department of Energy's Energy

Research Advisory Board. S. 2813's timetable is designed to fit with this schedule as phase I is to be completed by 1992 and final decisions on phase II strategies can be made as late as the end of 1993. In contrast, S. 2203's 1991 deadline clearly will not permit states and utilities to rely on fully demonstrated clean coal technologies to meet the 0.7 lbs SO2 per million Btu's emission rate mandated for each plant.

The Cost

Therefore, we believe that S. 2203 in effect mandates the installation of the dinosaur technology of scrubbers for virtually every coal-burning power plant in the country. This means, of course, that the cost of S. 2203's approach is exceptionally high. Congressional Budget Office estimates place the cost of S. 2203 at $93.6 billion over twenty years. This is almost three times as high as the rough estimate for a sulfur dioxide reduction strategy similar to the one suggested in our bill and more than three times as high as their $25.9 billion estimate for the Sikorski-Waxman bill currently being considered in the House. A preliminary analysis by ICF, Inc. recently completed for EPA finds even higher costs. The new study lists S. 2203's cost for SO2 reductions at $12.3 billion annually and the cost of its NOx controls at $10.4 billion annually for a grand total of $22.7 billion annually. The study points out that this is nearly 8 times the estimated total annual costs of H.R. 4567 and S. 2813. For sulfur dioxide alone, this means that for a roughly forty percent increase in sulfur dioxide reduction, S. 2203 would cost four times as much as either of the other bills. From the consumer's point of view, these types of costs are hard to justify.

Low Sulfur Coal Availability

Proponents of S. 2203 argue that such cost discrepancies are exaggerated because some coal-fired plants could meet the S. 2203 standard by switching to low sulfur coal. I believe the evidence is quite the contrary. A recent study conducted by Resources Data

International, for example, indicated that only four mines out of the approximately 4900 active mines in 1985 consistently produced coal clean enough and with a high enough Btu content to meet the standard set in S. 2203. Together, those four mines (all of which are located in the Powder River Basin in Wyoming/Montana) produced 10.4 million tons of coal in 1985 and have a maximum production capacity of 27 million tons. This total is obviously minor when compared to the almost 1200 million tons of coal ICF, Inc. projects will be demanded nationally in 1995.

Much has been made of a study on coal reserves by E. H. Pechan and Associates to the effect that there are enormous reserves of coal which could meet the qualifications stipulated in S. 2203. I question the assumption that such enormous reserves exist and that they could be mined to meet the .7 lb SO2/MMBtu standard. In the report, Pechan and Associates state that their "results should be interpreted with caution since substantial quantities of coal resources" were evaluated "on very limited analytical measurement data." Moreover, the study does not distinguish between reserves currently under production and reserves which have never been developed or leased. Most observers believe that development of a new western mine takes an average of 8-10 years. It takes time to secure a lease, obtain permits, plan the mine's construction, negotiate contracts and construct the mine. New mines designed to exploit coal reserves capable of meeting a .7 lbs per million Btus emission rate could not be in operation by 1991 unless the process were already more than half completed.

In addition to these constraints, S. 2203, further discourages the use of low sulfur coal through its provision requiring that all existing power plants comply with the new source performance standards when they reach thirty five years of age. This basically means plants must put on scrubbers. It would make many utilities hesitant to go to the expense of breaking coal contracts and/or modifying the physical parameters of their plants to utilize lower sulfur and lower Btu coal since they will also be required to install scrubbers at a later date. In contrast, S. 2813 provides states and sources complete freedom in choosing their methods of reducing SO2 emissions. And it provides flexibility by mandating statewide emission rate targets rather than plant-by-plant requirements. Consumers are given real protection from unnecessarily high increases in their electric rates because of this flexible approach which encourages the most cost efficient solutions for emission reductions.

Energy Conservation Incentives

Furthermore, S. 2813 improves on both the House bill and S. 2203 by encouraging the use of energy conservation strategies for controlling emissions. Emission rate requirements provide no credit for energy conservation, since conservation basically means that you run plants less. Running a plant less doesn't change its emission rate, but it reduces the total amount of pollutants. Our bill gives states the option of meeting a tonnage target instead of an emission rate and thereby gives credit for conservation efforts. It takes a positive step towards reducing the country's energy consumption at the same time that we are reducing the environmental damage to our lakes and forests.

Nitrogen Oxides Control

S. 2813 also protects consumers in its approach to nitrogen oxides controls. The bill mandates use of the most cost-effective means of reducing NOx emissions from power plants and requires higher, but readily achievable, standards for NOx emissions from cars and trucks. In contrast to S. 2203 which would require the use of costly selective catalytic reduction techniques for power plants, our bill would rely on more fully tested technologies. The tighter standards for cars and trucks are particularly important for western states. To the extent that the west has areas that are potentially sensitive to acid rain, the major experts believe the culprits are nitrogen oxides from mobile sources and sulfur dioxide from Mexican and U. S. smelters. Our bill addresses both of these effectively. U. S. smelters are given notice that there will be no further extensions on their compliance orders, and the State Department is directed to negotiate an annex agreement to cleanup emissions from the new Nacozari and Canonea smelters in Mexico.

Improvements to Implementation

Effective implimentation of environmental laws is frequently overlooked when Congress develops new environmental statutes.

S. 2813 deals with some of these potential problems in advance. For example, the bill requires that all utilities install continuous emission minitors on their smokestacks, so that states can have a real idea of what emission levels they achieve. Currently, the Clean Air Act relies on models and FERC reports of coal supplies for insuring compliance, "after the fact", with emission rates. This requirement puts an end to the paper games plaguing enforcement of emission limits for existing facilities. EPA now requires such monitors on new plants. If we are serious about reducing emissions, then it makes sense to require the installation of monitors. This provision also makes it easier to police emissions trading between facilities. Our bill provides complete flexibility for trading, thus realizing significant savings to consumers. The coupling of trading with requirements for emission monitors and improved plant recordkeeping means a more workable acid rain reduction program.

Finally, while I support the goals of S. 2203, I believe that our bill would be a wiser choice for acid rain control. It would achieve significant emission reductions for a much smaller cost and provide far greater flexibility and compatibility with state law. And it would encourage the development of clean coal technology, energy conservation, and the use of low sulfur coal and other least cost approaches to emissions reduction.

In sum, I want to stress we introduced S. 2813 at this time to get some important ideas on the table. I know that all of us who joined together on this bill want to work closely with you, Mr. Chairman, in developing acid rain legislation that deals effectively both with the issue and with the political problem of winning Senate approval. Your leadership on this issue has been deeply appreciated. I hope that you and the other members of the Committee will consider the elements of S. 2813 as you fashion a package for Senate floor consideration. Thank you. I would be happy to respond to any questions you might have.

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TESTIMONY OF SENATOR JOHN F. KERRY BEFORE ENVIRONMENT AND PUBLIC WORKS HEARINGS ON ACID RAIN LEGISLATION:

SEPTEMBER 25, 1986

I appreciate the opportunity to appear before this committee and I am grateful, from a New England perspective as well as a national perspective, that you are raising the issue of acid rain legislation at this time. I agree with Senator Proxmire, who has previously testified, that it is vital that we set the agenda now for the beginning of next year and I am delighted that the committee is doing so.

I became involved with the problem of acid rain when I was responsible for federal/state relations as Lieutenant Governor of Massachusetts. I was appointed by Governor Dukakis to serve on the National Governors Association Task Force as one of ten members. In the course of that effort I journeyed to Europe on a fact finding mission representing the New England Governors Task Force. I went to Norway, Sweden, Belgium, Germany, and Great Britain. In Norway I spoke with their experts who have been coping with this issue for a long period of time and where there are approximately five thousand square miles of lakes that are now dead. They have no doubt as to what has caused that ecological disaster. In Sweden some eighteen thousand square miles of lakes are dead and none in Sweden contests the issue of how or why that has come to happen. In addition, in Sweden, they were particularly concerned about increasing evidence of forests that were showing diminished growth and they had no doubt that air pollution was the major contributor. In Germany I saw the most stark and dramatic display of what has happened because of inattention to this matter. I visited the Black Forest with German foresters who literally were close to tears over the disappearing of the very heritage of their country. They have no doubt as to the cause of this problem. Recently, Great Britain, which was one of the reluctant participants in any of the dialogue, has finally joined in acknowledging that acid rain is a problem and that they are a major contributor to the problems of western Europe because of the flow of winds.

It is also very dramatic and disappointing when we see what has happened here in this country. President Reagan has commissioned several studies on acid rain and each has come back and said that acid rain is a major problem and must be addressed. However, on a national basis, we are still ignoring it. I therefore hope that this committee will undertake the initiative to move on this issue at the beginning of the next session.

In Massachusetts we have been conducting an ongoing study since 1983 to try to provide a data base. Dr. Paul Godfrey of the University of Massachusetts has been tracking acid rain information and we feel that we have enough data to understand what is occurring throughout the state. I would briefly like to share some of this information with you. Six percent of the surface waters tested are now classified as acidified, which means that they have a PH of 5.0 or less; sixteen percent are critical; nineteen percent are endangered; twenty-one percent are highly sensitive; twenty-three percent are sensitive; and fifteen percent are not sensitive. This means that sixty-two percent of the surface waters tested are classified as highly sensitive to acidified. Studies on the alkalinity levels, which really measure the acid buffering capability of our surface waters, show that most areas of the state have low alkalinity levels and thus are highly susceptible to acidification.

Acid deposition (as rain, mist, fog, and snow) obviously impacts upon our freshwater resources and forests. We have reason to believe that it negatively influences human health, especially of those individuals with respiratory ailments, heart problems, and related conditions. In Massachusetts, we are spending approximately $13 million per year to protect and restore statuaries and buildings which are literally being eaten away by acidic moisture. The effects on agricultural production are just now being researched. If you take the problems we know of in Massachusetts with their associated human, ecological, and financial impacts and project these on a national scale, the deterioration becomes enormous, as do the costs involved.

The issue among members of this committee is not so much whether we want to proceed but how we proceed. It is obviously a contentious issue with costs and whenever we hear about costs in today's world, it becomes very difficult to move forward.

I would like to share with the members of this committee some of the conclusions and recommendations which I have embraced in an acid rain bill, which I have sponsored. Please let me make it clear that I am not here to serve as an advocate for my bill but to simply add items for consideration so that we can come up with a good solution. We found that there was a final "meeting of the minds" in the Governors Task Force in order to bring together the different geographical regions of the country. We did reach a compromise and we were able to say, as a group that represented many diverse areas and interests, that we thought that there ought to be a cost sharing effort. We should not simply point a finger at utilities or the coal people and blame them for the problems we are facing. It is a national problem and we want to mitigate, as much as possible, the cost for each of the parties. We sought a way to do just that. I think that there is a way to do this that reflects the best of the "polluter pays" concept while, at the same time, not bankrupting companies or putting them at an economic disadvantage so that they can no longer compete in a continuingly competitive world. In addition, I think that it is possible to try to satisfy the high sulfur/low sulfur dilemmas of West Virginia and some of the western states. The way to do that is to obviously reach compromise. I am recommending that we allow as much flexibility as possible.

Senator Proxmire, in his testimony, spoke of the necessity of this flexibility. I do not think that it is not wise to mandate specific technology such as scrubbers but we should permit the states the opportunity to decide how to accomplish the necessary reductions.

To do this, I am recommending that we create a fund to subsidize the cost of capital equipment to reduce emissions based on a payment of approximately $147 per ton reduced. The payment formula would favor the installation of capital equipment to avoid coal miner job displacement while fixing the subsidy at a level which will permit the use of newer and less costly technologies. I would further recommend the establishment of a three-tiered graduated fee on electricity generation to collect that subsidy. This would result in shifting the burden from areas of the country where sulfur emissions are currently lower to those areas which have greater emissions but which will, as a result, receive greater subsidies from the fund. I believe that this system results in a balancing where those people who have cleaned up will put in less money which reflects their cleanup. This system attempts to bring people into the solution in a way that does not displace jobs and create an inequity in the process. I will submit that plan to this committee in considerably greater detail.

In addition to this, I recommend a fund for research and development efforts which will assist us in the process of bringing new technologies on line. I think that the technology can be there very quickly once we have a mandate and if our mandate is flexible enough to allow that technology sufficient time to come on line, it will not be as costly a process as many people have asserted.

In closing, Mr. Chairman, I want to thank you again for the opportunity to testify on this important issue. I wish to submit for the record the executive summary of a report which Governor Dukakis and I wrote entitled, Acid Rain and Related Air Pollutant Damage: A National and International Call for Action based on the work we have done in our state. I hope very much that in the course of next year, I, and others, will be able to join with you in cooperating to try to forge a compromise on this issue. I cannot underscore how critical I think this issue is.

ACID RAIN
and
RELATED AIR POLLUTANT DAMAGE
A NATIONAL and INTERNATIONAL
CALL FOR ACTION

August, 1984

This document was prepared by:

Massachusetts Department of Environmental Quality
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Division of Air Quality Control
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THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE DEPARTMENT
STATE HOUSE • BOSTON 02133

MICHAEL S. DUKAKIS
GOVERNOR

FORWARD

This Report makes an important contribution to our knowledge of the damages inflicted on the environment of the United States by acid rain. It also assists us in designing an effective solution to this problem by documenting the actions that have been taken by other industrialized nations. In sum, this Report makes a compelling case for the United States to undertake a major initiative to solve the acid rain problem.

I commend the environmental experts in the Department of Environmental Quality Engineering (DEQE) for the outstanding job they have done in compiling this excellent Report. In addition, Lt. Governor Kerry and Secretary of Environmental Affairs Hoyte have my grateful thanks for their leadership on this crucial environmental issue.

Finally, I want to personally thank Dr. Anthony Cortese, who until recently served as Commissioner of DEQE, for his extraordinary service to this Administration and to the citizens of the Commonwealth.

Governor Michael S. Dukakis

ABSTRACT

This study finds:

- Damage to natural and human-made resources from acid rain, or more accurately acid deposition, and other forms of air pollution is severe and is occurring throughout the world.
- A reduction in acid deposition and other pollutant emissions is the only way to alleviate the damages.
- The benefits from reducing acid deposition-related emissions are substantial and would accrue particularly to the midwestern states which would make the largest emission reductions.
- The United States, which is experiencing long range transport of acid deposition-related pollutants similar to European countries, should take its cue for action from these countries, as well as from Canada and Japan.
- The United States' program for air pollution and acid deposition control must be comprehensive. The damage is far more extensive geographically than the Northeast and the damages extend well beyond aquatic ecosystems.

This study recommends:

- Control of both sulfur dioxide and nitrogen oxides pollutants cause damages, so both should be reduced.
- A 48-state program -- effects are occurring throughout the continental United States, so the program must include all states with high emissions.
- Immediate commencement -- the damages are so great that waiting will only increase the clean-up efforts and the cost.
- Revision of the primary human health-based National Ambient Air Quality Standards.

I. EXECUTIVE SUMMARY

A. INTRODUCTION

Acid Rain and Related Air Pollutant Damage: A National and International Call for Action highlights the widespread environmental damages caused by acid rain (or more accurately, acid deposition) and related air pollutants in the United States and other countries, and discusses steps that other countries have taken to reduce air pollution and acid deposition. The purpose of the report is: 1) to provide information to decision makers to increase their awareness of the need for immediate action to reduce air pollution and acid deposition through discussion of damages throughout the United States, Canada, Japan, and Europe; and 2) to illustrate the feasibility of air pollution reductions in the United States by describing the actions taken in other countries.

Acid Rain and Related Air Pollutant Damage: A National and International Call for Action is the result of the Massachusetts Department of Environmental Quality Engineering (DEQE)'s efforts since early 1983 in researching the acid deposition problem on a local and national level and developing policies for acid deposition and related air pollutant control. This participation began with a proposal made by Massachusetts Governor Michael Dukakis in February, 1983, that a Massachusetts Acid Rain Strategy be formulated to accelerate research, make amendments to the Clean Air Act, and discuss with the federal government and the U.S. Environmental Protection Agency how to reduce emissions.

Governor Dukakis formed the Massachusetts Acid Rain Work Group (ARWG) co-chaired by Lt. Governor John Kerry and Secretary of the Executive Office of Environmental Affairs, James Hoyte in May, 1983, to assist in developing this strategy. The ARWG is comprised of representatives from DEQE and other state agencies, environmental groups, utility companies, labor, and industry. It advises the Governor and conducts technical and policy reviews on the acid rain issue. While consensus among the diverse interests represented on the ARWG is not always possible, the State's policies and positions have benefited from an open discussion of alternatives. The concerns and issues raised by the ARWG have been taken to the Coalition of Northeast Governors, the National Governors' Association, and the New England Governors and Eastern Canadian Premiers Conferences to develop a national acid deposition control program that will address the concerns of the different regions of the United States.

To provide new information to the national acid rain debate, Lt. Governor John Kerry headed a Massachusetts delegation on a one-week, fact-finding trip to Europe in January, 1984, to discuss acid deposition and air pollution damages and control programs with European nations actively involved in these issues. At that time, Lt. Governor Kerry requested that DEQE write a report that would promote a national acid deposition/air pollution control program and change the nature of the acid rain debate in three ways: 1) focus it on the effects of air pollution in general, and not just acid deposition--particularly human health impacts, material damages, and visibility impairment, issues not usually discussed in relation to acid deposition; 2) widen it to include air pollution effects throughout the 48 states, and not just the widely-discussed effects on the New England and New York regions; and 3) direct it to the feasibility of solutions by showing what other countries have done to remedy acid deposition effects.

The first section of the report contains seven chapters on the effects of acid deposition and related air pollutants throughout the United States. The first chapter describes the pollutants, their concentrations, and where they occur. Following are chapters on aquatic resource damages, terrestrial resource damages, human health impacts, cultural resource and material damages, and visibility impairment. The seventh chapter is an assessment of the economic benefits of acid deposition control.

The second section provides information on acid deposition and related air pollutant damages and air pollution control policies in other countries. Seven countries are discussed in the chapter entitled "Major Emphasis": Canada, West Germany, Great Britain, Japan, The Netherlands, Norway, and Sweden. These are countries whose governments either recognize that damage to resources is occurring from acid deposition and related air pollutants, and are acting to alleviate the damages; or are being prodded by other parties and organizations to do so. These seven countries have readily available information on this issue. The chapter entitled "Minor Emphasis" provides information on eight countries that have evidence of air pollution, but do not have readily available information on damages and/or do not have well developed control programs.

Finally, the Appendix explains the functions of the European and International Institutions that are active in the acid rain issue, since these institutions may not be familiar to readers in the United States.

B. SUMMARY

Acid rain is frequently portrayed as air pollutants from midwestern coal-burning plants causing the death of fish in New England and New York state lakes. While accurate in part, this portrayal represents only a tiny part of the acid rain problem.

The phenomenon of acid rain encompasses a variety of pollutants other than relatively high acidity (low pH) in rainfall. It includes all forms of precipitation, and acid in fog, dew, and mist. Additionally, the same pollutants that form acids in rain -- sulfur dioxide (SO_2), nitrogen oxides (NO_x), and their transformation products, sulfates and nitrates, -- can cause a plethora of problems in the ambient air and when dry deposited.

Acid rain, or more accurately acid deposition, and related air pollutants affect entire aquatic ecosystems. Increasingly, they are suspected as major contributing factors in observed damage to terrestrial ecosystems. And, although often ignored, they also detrimentally affect human health, building materials and cultural resources, and visibility.

The effects of acid deposition and related air pollutants are widespread throughout the United States, and are not just in the Northeast (see Executive Summary Appendix for further detail). Recent research documents sensitive aquatic systems in areas from the Pacific Northwest to Florida. Growth declines in forests have been observed in the northern, central, and southern Appalachian Mountains, and as far south as North Carolina. Human health, visibility, and materials effects occur wherever air pollutants are found in significant concentrations. In fact, the ambient concentrations of these pollutants are generally highest in regions of highest emissions. Thus, the effects on materials, human health, and visibility are greatest in these areas, specifically the midwestern states.

Similar damages to natural and human-made resources are also occurring in Canada, Europe, and other parts of the world. Several countries have already begun taking steps to control the emissions that cause acid deposition, have made commitments to further reductions, and have joined with other countries to advocate international emission reductions.

Immediate action must be taken to reduce air pollution and acid deposition in the United States through emission reductions and revision of the National Ambient Air Quality Standards.

C. CONCLUSIONS

1. Damage to natural and human-made resources from acid deposition and other forms of air pollution is severe and is occurring throughout the world. Acid deposition is one significant symptom of air pollution problems involving primarily sulfur dioxide (SO_2) and nitrogen oxide (NO_x) emissions and their resulting secondary pollutants transported as acids and acid particles. Acid deposition and other forms of air pollution are considered at least a contributing factor to the following effects:

   - Aquatic ecosystem damage caused by acid precipitation has been documented in Europe and eastern North America. Acidification of fresh-water has occurred in New England and the greater Northeast, in southern Canada, and in other regions which lie downwind of or within major industrial areas. Aquatic resources which are sensitive to acid deposition also exist in the Southeast, areas of the central Rocky Mountains, and the Pacific Northwest. Continued current levels of acid deposition will likely lead to contined water resource acidification, loss of fish populations, and highly corrosive drinking water.

   - Growth declines in forests in the United States and forest damage in Europe are most likely caused by a combination of acid deposition, SO_2, NO_x, ozone, toxic trace metals, and environmental stresses such as drought. Declines in the United States have been documented in high elevation forests and in the Northeast, Ohio, and as far south as North Carolina. Perhaps most disturbing, the extensive decline in tree stands in low and high elevation regions of West Germany exhibited the same declines beginning in the 1960's that we are now seeing in the United States. In West Germanuy, as much as 35 percent of the forest area may be affected, up from eight percent in 1982 (Ministerium, 1983).

   - The air pollutants associated with acid deposition can have direct effects on human health. For example, evidence indicates that current SO_2 levels are likely to produce adverse health effects. Current short term peaks of nitrogen dioxide (NO_2) may increase respiratory illness rates and exacerbate bronchoconstriction during asthmatic attacks Sulfates can cause bronchoconstriction at high concentrations. In addition, studies suggest that asthmatics and individuals with upper respiratory infections may be susceptible to nitrate-induced bronchoconstriction. The health effects of multiple pollutants acting together may be additive or synergistic. As a result, pollutant levels which have been judged safe when pollutants are in isolation may become hazardous when the pollutants occur simultaneously.

- Acid deposition and air pollution at current ambient levels is damaging materials -- metal, stone, and exterior coatings -- as well as important historic and cultural resources.

- The damage to human health and material resources is most severe where concentrations of pollutants are highest. Areas of high concentrations occur in many regions of the United States. Air pollution causes a deterioration in visibility. Such impairment is occurring throughout the eastern and southwestern United States. One study estimates that a 31-state, 12-million ton SO_2 reduction will improve visibility in the eastern United States by over 13 percent (Latimer et.al., 1984).

2. Action to control air pollution must begin immediately.

   - The National Academy of Sciences (National Research Council, 1981) projects that, "At current rates of emissions of sulfur and nitrogen oxides, the number of affected lakes can be expected to more than double by 1990, and to include larger and deeper lakes."

   - It may already be too late to reverse the long-term decline of much of the central European forests from gaseous pollutants. The emission reductions that countries such as West Germany are undertaking may not save the forests, since the pollution effects appear to be cumulative and the recovery time long. Central Europe's experiences should serve as a hard lesson for the United States; recent observations of forest decline in this country should be taken seriously.

- People with greatest risk to their health from exposure to air pollution include those with allergies, children, bronchitics, individuals with other severe respiratory and cardiovascular diseases, the elderly, smokers, and people who habitually breathe through their mouths. Continued risk to such a large proportion of our population must not be allowed.

- The historical and cultural resources being damaged are irreplaceable.

- Deterioration of visibility is affecting public enjoyment of scenic beauty.

3. A reduction in acid deposition and other related pollutant emissions is the only way to alleviate the damages.

   - Mitigation techniques do not exist for most of the effects described. According to the National Academy of Sciences (National Research Council, 1981), "Of the options presently available, only the control of emissions of sulfur and nitrogen oxides can significantly reduce the rate of deterioration of sensitive fresh-water ecosystems." Where techniques do exist, such as lake liming and coating of metal statues, they can only realistically be applied to a limited number of the resources-at-risk.

4. The benefits from reducing acid deposition-related emissions are substantial and would accrue particularly to the midwestern states which would make the largest emission reductions.

   - In most estimates of the benefits of SO_2 reduction, benefits to aquatic resources account for less than 10 percent of the total benefits. The Midwest would receive a significant share of the total benefits from SO_2 control, since the damages for the other categories will be concentrated near those areas with the highest emissions, i.e., the Midwest.

- A 12-million-ton SO_2 reduction program would result in a savings of approximately $2.3 billion annually in materials damage in the eastern United States.

- Latimer et.al. (1984) estimated the value of visibility improvements from a 12-million-ton SO_2 reduction to be approximately $4.2 billion annually. The states with the highest emissions would have the greatest improvements in visibility.

  (To estimate the value of visibility improvements, one must first determine the value which people place on visibility improvements. Survey techniques where respondents are asked to indicate what they would be willing to pay for different visibility levels are generally used to elicit this information. This study estimated that value as $2/person/year for a one percent change in visibility.)

- The Latimer study indicated that the reduction program would reduce human exposures to sulfate in 1995 by 36 percent.

Unfortunately, given the current level of understanding, the total benefits from different levels of control cannot be compared with control costs, since it is impossible to estimate the cost of damages from acid deposition to some resources, and hence quantify the benefits. Based on the best available information, however, the benefits of acid deposition controls (12-million-ton SO_2 emission reduction) far outweigh the costs. Benefits to visibility and materials alone (estimated at $6.5 billion annually) approximately equal cost of control estimates. If health, terrestrial, and aquatic benefits are included, the total benefits far outweigh the costs of control.

5. The United States, which is experiencing long range transport of acid deposition-related pollutants similar to European countries, should take its cue for action from these countries, as well as from Canada and Japan. The threat of environmental damage within their own borders has caused a number of European countries to reduce their emissions and to urge other countries whose

emissions affect them to make similar reductions. The existence of long range transport is no longer questioned in Europe and Canada. The only questions are: How much should emissions be reduced, and where?

- The Scandinavians were the first to recognize the dangers of acid deposition, and the first to press for international action. Sweden, with its poorly buffered soil and relatively high acidic deposition, estimates that 18,000 of its approximately 85,000 lakes are showing signs of acidification. Sweden is also very concerned with acidification of its municipal water supplies. To combat acidification damage, Sweden has reduced its SO_2 emissions by 35 percent since 1970. It is also one of the strongest advocates for a 30 percent reduction of SO_2 emissions in all European countries.

- In Norway, massive damage to aquatic resources has also promoted local action and calls for international action. The combination of poorly buffered terrain, heavy snowfalls resulting in spring acid surges, and acid deposition (pH 4.2 to 4.5) has resulted in extinction of fish populations in 1,750 of 5,000 lakes in southern Norway. The Norwegians focus on international action because over 90 percent of acid deposition in Norway originates from areas outside Norway's borders. Nevertheless, the Norwegians plan to reduce their SO_2 emissions by 30 percent by 1993. They have already instituted a low sulfur fuel regulation.

- The Netherlands also attributes a large portion of its acid deposition to sources outside its borders. Terrestial damage from acid deposition and related air pollution worries the Dutch, as their forests are exhibiting symptoms similar to the damaged forests in West Germany. The Dutch are also acutely aware of damage to their cultural resources. Millions of dollars have been spent to restore monuments, carillons, and stained glass windows. Similar types of material damage are common to many historic structures throughout Europe.

- Action in Europe has been recently galvanized by West Germany. Over a very short time, the damage occurring to West Germany's forests caused the government to reverse its position from opposing pollution controls to strongly advocating at least a 30 percent reduction in air pollutants across Europe. The West German government has also established a program to unilaterally reduce SO_2 emissions by 30 percent, and to institute United States automobile emission control standards for NO_x and hydrocarbons.

- Canada, with its heavy economic emphasis on timber industries and tourism, places environmental concerns high on its list of national priorities. Damage occurring to Canadian aquatic resources and the threat of forest damage similar to West Germany have lead to a commitment to a 25 percent reduction in SO_2 emissions by 1990. An additional 25 percent reduction is promised if the United States passes legislation requiring a 50 percent reduction of SO_2 emissions. Over 48,000 lakes in Canada are threatened by acidification. Canada is also in the forefront of international efforts to control air pollution.

The United States' continued reluctance to undertake emission reductions has disappointed and strained relations with Canada and European countries that have come to view the United States as a world leader on environmental issues since the 1970's. A number of countries such as Sweden and the Netherlands are enforcing strict industrial and utility emission standards, conserving energy, and/or examining new ways to provide energy for businesses that will not contribute to acid deposition and air pollution. It is in the United States' best interests to learn from other countries experiences and proceed with the job of lowering our deposition levels before massive damage is visible.

6. The United States' program for air pollution and acid deposition control must be comprehensive. The damage is far more extensive spatially than merely the Northeast. The resources being damaged include health, materials, forests, and visibility, as well as aquatic ecosystems. Thus our response must not be piecemeal, e.g., treating a few symptoms through lake liming.

RECOMMENDATIONS

(1) An emission reduction program as follows:

(a) Control of both SO_2 and NO_x -- both pollutants cause damages, so both should be reduced.

(b) A 48-state program -- effects are occurring throughout the continental United States, so the program must include all states with high emissions.

(c) A control program which will protect virtually all sensitive resources. Additional actions to protect highly sensitive resources may be required.

(d) Immediate commencement -- the damages are so great that waiting will only increase the cleanup efforts and the cost.

(2) Revision of the primary human health-based National Ambient Air Quality Standards consisting of promulgation of:

(a) A fine particulate standard -- the present total suspended particulate (TSP) standard is inappropriate because it fails to directly regulate the most health damaging particulate fraction. Establishment of a standard for fine particles would also limit human exposure to many organic and metallic compounds associated with these particles which are derived from common sources.

(b) A one-hour SO_2 standard -- the present SO_2 daily and annual standards allow short-term SO_2 peaks which may adversely affect high risk groups.

(c) A one-hour NO_2 standard -- the present NO_2 annual standard similarly allows for peak concentrations which may adversely affect high risk groups.

The implementation of both of these recommendations will provide a comprehensive approach to the acid deposition problem. It will protect all the resources at risk, both those damaged by acid deposition and those damaged by ambient air concentrations of the related pollutants.

EDISON ELECTRIC
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Economic Evaluation of S. 2203

The "New Clean Air Act"

prepared for

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SEPTEMBER 1986

HIGHLIGHTS

Annual Results
S2203 Economic Evaluation

• Scope of Analysis	Includes SO_2 and NOX control costs
• SO_2 Reduction	12.3 to 13.5 million tons SO_2 long-term, with 11.6 to 13.1 million tons in the mid-1990's
• Compliance Methods	83 percent of total U.S. coal-fired capacity would be affected by the SO_2 requirements, and virtually all coal, oil, and gas units could potentially be affected by the NOX provisions
• Annual Costs	$10.8-15.4 billion per year levelized over 20 years, 1991-2010, in constant 1986 dollars

Coal-fired plants	Case 1	Case 2
SO_2 compliance	$7.3	$8.1 billion
NOX compliance	3.0	5.5
Oil-fired plants		
SO_2 compliance	0.0	0.2
NOX compliance	0.2	0.7 billion
Gas-fired plants		
NOX compliance	0.3	0.9 billion

• Rate Increases	10 percent or more in 8 to 24 states, with the top statewide average at 17 to 20 percent, on a 20-year levelized basis
• Compared to H.R.4567	Two to three times as expensive as H.R. 4567, based on TBS estimate of levelized cost for that bill of $5.0 billion

INTRODUCTION

A bill for acid deposition control was introduced in the U.S. Senate by Senator Stafford and others on March 18, 1986. It would:

- Control sulfur dioxide and nitrogen oxide emissions from electric utilities, industrial boilers, and other major energy production and processing facilities
- Expand controls on light- and heavy-duty vehicles, diesel fuel, and vehicle inspection and maintenance programs
- Implement monitoring of dry deposition of acidic pollutants and of lake chemistry and related factors, especially in the West
- Require the President to institute negotiations with Canada and Mexico to control transboundary air emissions and to stimulate increased monitoring and R&D
- Require the Secretary of the Treasury to prepare a study on a system of emissions tariffs to reduce air pollution

This report is focused on identifying the potential costs of this bill on the electric utility industry and its customers. It has been prepared on behalf of the Edison Electric Institute, which represents the investor-owned electric utility companies.

S2203 REQUIREMENTS FOR ELECTRIC UTILITIES

There are three major control program elements that would affect electric utilities:

I. New Source Performance Standards (NSPS) Effective January 1, 1991: Section 111 of the Clean Air Act would define as "New Sources" all stationary sources of SO_2 or NOX which are 35 years old or older.

II. Operating Hours Effective January 1, 1992: New section 129 of the Clean Air Act would limit the remaining operating hours of electric utility units to:

3,000-- for sulfur dioxide emissions greater than 1.5 lbs/mmBTU;
10,0000-- betweeen 0.7 and 1.5 lbs/mmBTU;
unlimited-- below 0.7 lbs/mmBTU.

III. NOX Effective January 1, 1995: Major stationary sources of NOX would be required to attain the degree of emission reduction demonstrated to be available for existing sources in any OECD member country (which includes Japan and Europe).

METHODOLOGY

- For this analysis, a cost optimization approach has been used on a unit-by-unit basis, since the bill would impose requirements at that level, without opportunities for emission trading or averaging. Specifically, the approach was to determine the least costly strategy from the range of compliance options available, including retirement, for each coal, oil, and gas unit that would be affected:

  --Based on a net present value cost comparison over each unit's remaining lifetime

  --Using two cases to account for a range of assumptions on key factors such as plant life extension, future plant utilization levels, control technology costs, degree of penetration of advanced technologies, and levels of NOX controls required

  --Using unit-specific data on age, size, fuel use, emissions, and retrofit factors

- The results from this analysis are representative of the costs that this legislation would lead to on a national and state level, and are appropriate for policy-level comparisons with other proposals. These cost estimates, however, cannot be exact because of the significant uncertainties regarding how this bill would be implemented and long-term trends in areas such as coal prices, utility plant life extension, and the development of new emissions control technologies.

- Details on the methodology and assumptions are included in a separate volume.

SO_2 COMPLIANCE ACTIONS EVALUATED

This analysis included a broad range of compliance options available to individual utilities. The selection among those that are technically feasible for a given generating unit was based on a net present value cost comparison over the unit's remaining operating lifetime.

- Options for NSPS compliance for coal-fired units
  - --Flue-gas desulfurization (FGD), or scrubbing, at NSPS levels
  - --Advanced technologies, such as LIMB (lime injection multi-stage burning) and new scrubber technologies as they become commercially available
  - --Retirement
- Options for compliance with a 0.7 lb/MMBtu SO_2 limit
  - --Acceleration of the NSPS strategy for the given unit to the date of this requirement
  - --Switching to very low sulfur coal from the West, to the extent it's available
  - --Retirement
- Options for compliance with a 1.5 lb/MMBtu SO_2 limit
  - --Acceleration of the 0.7 lb compliance method
  - --Switching to low sulfur coal from either the East or West, depending upon location
  - --Retirement
- Oil-fired units' options for SO_2 compliance at all these levels
  - --Desulfurized oil
  - --Retirement

NOX COMPLIANCE ACTIONS EVALUATED

The designation of which technologies are "demonstrated to be available for application to existing sources" (BDT) for NOX removal is very uncertain. Presumably that would be done by EPA in a normal regulatory proceeding and might include designations of different technologies for different types of generating units.

This analysis is based on a range of potential designations of BDT, represented by the following:

- High end of the cost range

  --Selective catalytic reduction (SCR) required on all coal, oil, and gas units. SCR is currently in use in some OECD countries. There are four demonstration projects in the United States on gas and coal units.

- Low end of the cost range

  --SCR required on the largest units (over 500 mW)

  --Burner modifications on smaller units except for cyclone or wet bottom boiler coal-fired units under 500 mW where nothing would be required

TWO CASES EVALUATED TO REPRESENT A POSSIBLE RANGE OF COSTS

To help in dealing with the uncertainty in many areas regarding compliance actions and costs under S.2203, ranges were evaluated on many key assumptions. Still, sufficient uncertainty remains that the identified cases may not represent absolute upper and lower levels of compliance costs.

	Case I	Case II
• Average lifetime for generating units	50 years	60 years
• NOX compliance requirements	SCR on units over 500 mW, burner modifications elsewhere, except cyclone and wet bottom boilers	SCR required on all fossil units
• Use of innovative or advanced technologies or equivalent	high end or availability range--15% of retrofits in 1995-1999, 75% after 2005, 40% cost reduction for these technologies.	low end of availability range--10% of retrofits in 1995-1999 up to 50% after 2005, 40% cost reduction for these technologies.
• Low sulfur coal availability and price differentials at estimated tonnages	High availability and low end of regional price ranges	Lower availability and high end of regional price ranges
--Western coal, 0.7 lb/MMBtu	--Up to 120 mm tons, $3-15/ton	--Under 100 mm tons, $5-over 20/ton
--Western coal, 1.5	--Unlimited, $0-5	--Unlimited, $0-5
--Eastern coal, 1.5	--High availability $2-5	--High availability, $4-9
• Replacement of early retirements	No replacement	Replacement with like capacity
• Plant utilization levels	1980-1983 average levels	10% higher to reflect load growth

TIMING OF S.2203 REQUIREMENTS

The provisions of S.2203 would affect utility plants at different times.

- The NSPS requirement, covering units when they reach 35 years of age, would affect a large number of older units in 1991 and then a small number every year from 1992 through 2016

  --37 gigawatts (GW) of coal-fired capacity in 1991

  --from 4 to 15 GW annually thereafter

- The 1.5 lb/MMBtu limit on SO_2 emissions for 7,000 operating hours would affect 109 GW of coal-fired capacity, almost all in 1992

- The 0.7 lb/MMBtu limit on SO_2 emissions for all operating hours above 10,000, prior to the NSPS requirement at age 35, would begin for most units in the 1993-1995 time period, ultimately affecting 172 GW.

- The NOX requirement would all occur in a single year, 1995, and would affect 275 GW.

EMISSIONS REDUCTION

This bill would lead to a large reduction in SO_2 emissions from existing power plants.

- 11.6 to 13.5 million tons per year of SO_2 from coal-fired plants, depending upon future plant utilization levels, the mix of control technologies used and the years examined
- The long-term reductions due to the NSPS provision of the bill would be 12.3 to 13.5 million tons per year
- The earlier reduction in the mid-1990's would be 11.6 to 13.1 million tons

  --By then the NSPS provisions would led to SO_2 reductions of 3.4 to 3.7 million tons

  --The operating hours restrictions in the bill would result in an additional reduction of 8.2 to 9.4 million tons then

NOX emissions reductions have not been estimated in this analysis because accurate data on plant-level NOX emission rates does not exist.

THE USE OF SCRUBBERS FOR COMPLIANCE

Technological controls, primarily scrubbers, would be the dominant means of compliance with S.2203, primarily because of the NSPS provisions.

- The NSPS provisions require percentage reductions in emission rates that can only be met through technological controls

  --123 to 160 GW would be scrubbed eventually to meet NSPS

- To meet the operating hours restrictions for most units affected, the least expensive means of compliance would be to accelerate to an earlier date the scrubbing needed to meet the NSPS standards. Advanced or innovative technologies would not be available soon enough for use at most of these units.

  --122 to 128 GW, or over 70% of capacity affected by this requirement would scrub early to meet the 0.7 lb standard

  --94 to 95 GW, or over 85% of affected capacity, would also accelerate scrubbing for the 1.5 lb limit

IMPACT ON THE USE OF NEW TECHNOLOGIES

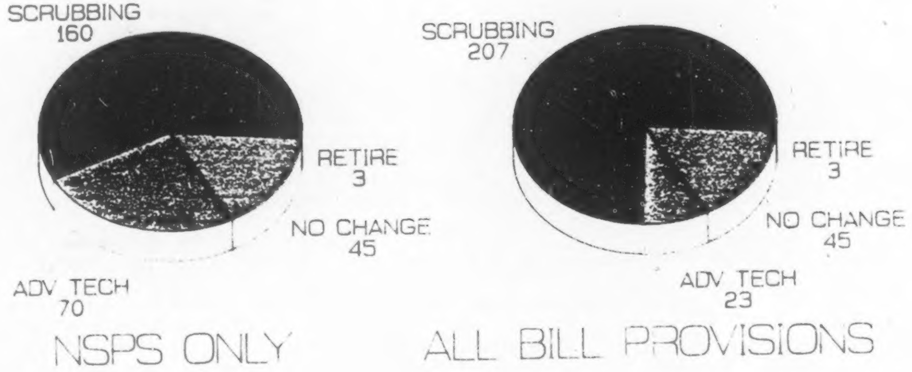
- The NSPS provisions of S2203, standing alone, would encourage to some degree the development of advanced technologies which would make the estimated cost of compliance in later years somewhat lower than it would be with present technologies. Additionally, new plants would also be able to benefit from the availability of these new technologies.

  --without the other provisions, innovative or advanced technologies would be installed on 70 to 105 GW

- However, the requirement beginning in 1992 that all plants must meet a 0.7 lbs/MMBtu SO_2 emission requirement after 10,000 hours would restrict this technological development. The least expensive means of compliance for most units would be to accelerate the installation of NSPS technology. However, for most units that would require installation prior to the time when the advanced technology would be commercially available on a wide scale.

  --taking these provisions into account, two-thirds of the projected use of innovative or advanced technologies would be lost, with the remaining usage at just 23 to 38 GW.

CHANGE IN CONTROL TECHNOLOGIES
BY PROVISIONS OF THE BILL - CASE II



GIGAWATTS

THE USE OF COAL SWITCHING FOR COMPLIANCE

Only a very small amount of coal switching would be expected.

- Eastern low sulfur coal could only meet the 1.5 lb SO_2 limit which, for most plants lasts less than 2 years. It is not low enough to meet the 0.7 lb standard.

- Western very low sulfur coal could meet the 0.7 lb SO_2 limit, which lasts over 20 years for some units. However, the cost and availability of such coal is very uncertain. Approximately 7 GW of capacity burned 21 million tons of that quality coal in 1985.

  --44 to 50 GW of capacity would utilize this very low sulfur coal

  --This would result in approximately 100 million tons of coal switching, almost all in Western states from units burning low sulfur coal now

COMPLIANCE STRATEGIES FOR COAL-FIRED UNITS INSTALLED IN 1983

	Case I		Case II	
	Units	Capacity (GW)	Units	Capacity GW)
I. 1.5 lb/mmBTU for 7000 hours				
No action*	794	169	794	169
Accelerate 0.7 compliance				
--FGD and innovative technology	276	95	272	94
--Very low sulfur coal	20	7	31	8
Switch to low sulfur coal	36	7	29	7
Total coal units	1,126	278	1,126	278
II. 0.7 lb/mmBTU until age 35				
No action*	690	106	690	106
Accelerate NSPS compliance	310	122	319	128
Switch to very low sulfur coal	126	50	117	44
Retire	-	-	-	-
Total coal units	1,126	278	1,126	278
III. NSPS requirement at age 35				
No action*	113	45	113	45
Scrubbers	834	190	932	207
Innovative technologies**	103	38	59	23
Retirement	76	5	22	3
Total coal units	1,126	278	1,126	278

---

*No action required because either currently below required level or would be affected by NSPS requirement prior to this time.

**Much of the innovative technology would be installed in later years. Through 2010 the amounts estimated for cases I and II are 68 and 46 GW, respectively.

ANNUAL COSTS

On a levelized basis over the first 20 years of compliance, 1991-2010, S2203 would have these effects on the electric utility industry and its customers (in 1986 dollars)

- Total revenue requirements would increase $10.8 to $15.4 billion per year.

- The SO_2 portions of the bill would account for $7.3 to $8.3 billion of that:

  --The operating hours restrictions would be slightly more expensive than the NSPS provision, at $4.0 to $4.4 billion per year.

- The NOX requirements are the least certain, depending upon EPA implementation, and could potentially be the most expensive of the three sets of requirements in the bill for utilities, accounting for $3.5 to perhaps $7.1 billion annually.

The annual cost during early years of the program would be higher than these levelized figures, with costs in later years correspondingly lower than average. With programs such as this which require substantial capital investments in the early years, the pear years' costs are often 1.5 to 2 times the levelized rate.

ANNUAL COSTS BY REQUIREMENTS OF THE BILL

Levelized Over 20 Years
1991-2010
(billion 1986 dollars)

	Case I	Case II
NSPS Requirement--SO_2		
Coal units	$ 3.3	$ 3.8
Oil units	0.0	0.1
Subtotal	$ 3.3	$ 3.9
Operating Hours Restriction--SO_2		
Coal units	$ 4.0	$ 4.3
Oil units	0.0	0.1
Subtotal	$ 4.0	$ 4.4
Total SO_2 Controls	$ 7.3	$ 8.3
NOX Best Demonstrated Technology		
Coal units	$ 3.0	$ 5.5
Oil units	0.2	0.7
Gas units	0.3	0.9
Total NOX controls	$ 3.5	$ 7.1
Total bill	$10.8	$15.4

ANNUAL REVENUR REQUIREMENTS BY TECHNOLOGY

Levelized Over 20 Years, 1991-2010
(billion 1986 dollars)

	Case I	Case II
Coal Units SO_2		
• Scrubbers	$ 6.5	$ 7.1
• Innovative Technologies	0.2	0.2
• Low and Very Low Sulfur Coal	0.6	0.7
• Replacement of Early Retirements	0.0	0.1
Subtotal	$ 7.3	$ 8.1
Coal Units NOX Compliance		
• SCR (Selective Catalytic Reduction)	$ 3.0	$ 5.5
• Burner Modifications	-	-
Subtotal	$ 3.0	$ 5.5
Oil Units		
• Desulfurized Oil	$ 0.0	$ 0.2
• NOX Controls	0.2	0.7
Subtotal	$ 0.2	$ 0.9
Gas Units		
• NOX Controls	$ 0.3	$ 0.9
Totals, all units	$10.8	$15.4

CAPITAL EXPENDITURES

S.2203 would require substantial capital expenditures for emission control technology. Much of that would occur in the first five years of the program with the first NSPS requirements, the operating hours restrictions, and the NOX controls.

- Scrubbers and innovative technologies for SO_2 control would require capital expenditures of $37 to $47 billion (1986) over the life of the bill

- NOX controls under the scenarios described earlier would require an additional $13 to $24 billion

- Combined capital expenditures for all provisions of the bill would be $51 to $71 billion (1986 dollars).

STATE AVERAGE RATE INCREASES

Ultimately, the compliance costs of this type of bill fall on the customers of the utilities affected. The residential, commercial, industrial, municipal and other customers would all experience rate increases to cover these costs.

- The range of state average rate increases, based on 20-year levelized costs versus rates and electricity loads in the mid-1990's would be:

  --for case I, 24 states over 5 percent, with 8 of them over 10 percent, and the top state at 17.4 percent

  --for case II, 24 states at 10 percent or more, with the top state average increase at 19.8 percent

- Increases in the peak years would be higher, approximately 1.5 or more times these rates, since these costs have been levelized over 20 years.
- Individual utilities in each state would experience increases that vary from the state averages, with some at higher rate increases and others at lower increases.

STATE ANNUAL COSTS AND RATE INCREASES

Levelized Over 20 Years, 1991-2010

(million 1986 dollars)

Range: Case 1 - Case 2

STATE	ANNUAL COSTS *		PERCENT RATE INCREASE **	
AL	$387,106	$514,188	7.8	10.3
AR	101,330	141,895	5.9	7.0
AZ	96,519	182,776	2.5	4.8
CA	45,747	346,372	0.5	3.4
CO	70,870	189,691	3.9	10.4
CT	14,786	130,077	0.5	4.5
DC	602	10,812	5.8	11.6
DE	42,109	78,790	5.5	10.3
FL	232,078	573,790	3.3	7.1
GA	467,414	584,191	12.4	15.2
HI	8,811	65,481	1.1	7.9
IA	147,964	198,804	9.2	11.9
IL	683,243	946,548	7.9	11.2
IN	659,132	833,339	12.5	15.8
KS	106,287	161,984	5.3	8.0
KY	408,846	570,629	13.0	18.1
LA	72,394	213,966	5.7	10.8
MA	110,406	330,145	3.2	9.8
MD	154,607	271,850	7.1	11.4
ME	8	9,755	0.0	1.4
MI	402,586	642,531	7.5	12.0
MN	141,690	178,828	6.8	9.1
MO	501,560	581,393	13.4	15.0
MS	92,822	134,104	8.8	12.1
MT	$7,516	$29,728	1.2	4.7
NC	587,677	710,330	11.0	13.8
ND	50,769	86,960	3.5	5.9
NE	80,623	112,870	7.1	10.0
NH	19,888	38,548	2.7	6.3
NJ	78,985	257,003	4.4	8.4
NM	88,374	108,887	3.2	5.1
NV	30,538	53,923	2.0	3.8
NY	155,633	486,004	1.3	4.2
OH	1,044,029	1,345,171	14.4	18.2
OK	94,792	207,258	3.2	7.1
OR	12,957	15,272	0.4	0.5
PA	802,065	1,083,280	7.8	10.6
RI	1,006	14,423	3.1	11.3
SC	121,426	211,037	4.5	7.8
SD	18,792	30,417	3.5	5.6
TN	436,332	592,125	11.3	15.4
TX	457,121	847,079	2.9	5.4
UT	16,284	76,881	1.7	7.9
VA	156,317	274,524	9.9	13.7
WA	68,250	73,000	2.0	2.2
WI	222,666	328,335	8.0	11.8
WV	728,742	828,558	17.4	19.8
WY	134,368	183,095	8.7	11.8

* For compliance requirements within each state
**Adjusted to account for major interchanges of power among states

COMPARISON WITH OTHER STUDIES

- Results from different studies and models can only be accurately compared when they are presented in consistent terms, such as levelized costs to levelized costs, and all in constant dollars.

- As this is written, only the Congressional Budget Office (CBO) has published another analysis which addresses major elements of this bill.

  --The CBO analysis, however, deals only with the long-term emission requirement of 0.7 lbs/mmBTU for sulfur dioxide. It omits the nitrogen oxide control costs and the effects of the NSPS requirement. For the 0.7 lb SO_2 limit, CBO estimates that annual compliance costs would be approximately $8.8 billion in 1995 (in 1985 dollars), and that the net present value cost from 1986 through 2015 would be $93.6 billion.

  --The most relevant comparison from this TBS analysis is to the net present value of compliance costs for all the SO_2 requirements excluding NOX. The net present value of these costs over 20 years, from 1991 to 2010, is $91 to $103 billion in 1986 dollars. The annual costs are $7.3 to $8.3 billion (in 1986 dollars), on a 20-year levelized basis.

- Comparisons show S.2203 to be from two to over three times the cost of H.R.4567 in the House of Representatives:

  --CBO's analysis reported a 1995 cost estimate of $2.5 billion to meet the major SO_2 requirements of H.R.4567.

  --TBS's earlier analysis of H.R.4567 estimated an annual compliance cost of $5.0 billion on a levelized basis for all SO_2 and NOX requirements, compared to the estimate in this report for S.2203 of $10.8 to $15.4 billion.

AMERICAN PUBLIC POWER ASSOCIATION
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Statement
of
Ruth Gonze, Assistant Director of
Government Relations
AMERICAN PUBLIC POWER ASSOCIATION
before the
SENATE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
on
S. 2203,
"NEW CLEAN AIR ACT OF 1986"

September 25, 1986

My name is Ruth Gonze, and I am the Assistant Director of Government Relations of the American Public Power Association. APPA is the national service organization that represents approximately 1,750 local publicly owned electric utilities throughout the United States, Puerto Rico, the Virgin Islands, Guam, and American Samoa. About one out of every six consumers in this country is served electricity by a public power system.

APPA supports national acid rain legislation which can meet reasonable standards of effectiveness, economy, and equity. As suppliers of electric power -- about two-thirds of which is derived from fossil fuels -- APPA members are willing to pay their fair share of costs. Yet, as representatives of millions of consumers, we also have a responsibility to ensure that costs are not unfairly apportioned and that an acid rain control program can achieve its objective of preserving the environment with a minimum in economic disruption.

We know that the committee appreciates the potential seriousness that acid rain poses to sensitive ecosystems. Yet, although APPA does not know what specific cost projections will be made by federal and industry studies for S. 2203, it is clear that national efforts to lessen the potential damage from acid rain will cost vast sums of money.

While a scientific consensus seems to be emerging that acid rain is a problem and should be controlled, controversy still exists among reasonable and responsible scientists as to the causes, sources, extent, and effect of acid precipitation. Apparently, all that can be said conclusively at this time is that all fossil fuel combustion emissions from both local and distant sources may be involved, including sulfur, nitrogen, chloride, and, perhaps, trace element emissions.

APPA believes, based on support from all regions of our membership, that a reasonable weighting of the interests of consumers in both a clean environment and in reliable electrical power at reasonable cost could be best achieved through adoption of the following central principles in acceptable acid rain legislation:

1. The program should include a nationwide funding mechanism based on an emissions fee applied to SO_2 and NO_x emissions from all fossil-fueled sources for which an emissions fee is feasible. Such sources specifically include utility boilers, industrial boilers, industrial processes, smelters, cars, and trucks. APPA specifically opposes electricity taxes.

2. Monies raised through emissions fees should be applied to fund adequately the most cost-effective, verifiable emission reduction measures. Such measures for SO_2 reductions specifically include fuel switching, fuels pretreatment, scrubber systems, fluidized bed combustion, and other measures now under development whose performance can be verified over the course of the program.

3. The program should be structured in two phases, with the continuance of the second phase contingent upon affirmative action by Congress. Given the substantial scientific uncertainties that presently exist, the very large costs associated with any reduction program, and the likelihood that improved information upon which to base decisions will be developed in the future, phasing would assure that mid-course corrections can be made in the program if necessary.

In light of these considerations, APPA cannot support the enactment of S. 2203. This bill does not give adequate consideration to the economic consequences for the country. It would be, according to the Congressional Budget Office, two to three times as costly as other legislation proposed in this Congress. While extracting many billions of extra dollars from American electric ratepayers, it would give them in return only two million tons more emission reduction than would be achieved by other programs.

Its enormous cost would not be borne, however, by all Americans. The people of a relatively small number of states would pay the entire cost. APPA supports national cost-sharing for any acid rain control measure; but the need to spread the costs is greatly heightened by the drastic expenditures envisioned by S. 2203. While requiring such expenditures, the bill would do nothing at all to lighten their impact on midwestern and eastern states.

As a practical matter, however, the bill appears to be so costly that no national funding scheme, whether based on emissions taxes or kilowatthour taxes or any other mechanism, which would have any chance of enactment by the Congress, would be sufficient to avert devastating impacts to the Midwest. To illustrate, the bill now being considered by the House Energy and Commerce Committee, H.R. 4567, contains a 1/2 mill per kilowatthour tax on non-hydro and non-nuclear domestically produced electricity. If this tax were fully collected, it would raise about $9 billion. If such a tax were included in S. 2203 and dedicated entirely to the Midwest, it would do very little to mitigate the impact of the bill on the midwestern population.

Section 129(a) offers the catastrophic prospect of taking out of service, within one-and-one-half to three years after December 31, 1991, every coal-burning plant that does not attain an emission rate of 0.7 lbs. of sulfur dioxide per MBtu of heat input. To meet that rate, virtually every plant in the country must simultaneously install flue gas desulfurization technology -- large plants and small, new and old, peaking and baseload. It seems possible to us that this goal would be unattainable, and the result could be widespread power shortages.

The purpose of S. 2203's requirement that plants older than 35 years be deemed new sources, and thus required to meet New Source Performance Standards, is somewhat difficult to penetrate. Its effect would be to require scrubbers on all old plants one year and 3,000 hours sooner than other plants. After this is achieved, then such plants must meet the bill's 0.7 lbs./MBtu emission rate limit by the same short deadline as is imposed on other plants. Some sponsors of S. 2203 have stated that the objective is to force the replacement of these plants by new plants. Yet, if such plants could meet the 0.7 lbs./MBtu emission standard, the country would gain nothing by their retirement except ruinous expense for the Midwest. There, the stock of existing plants is on average older, more costly to refit or equip with control equipment, and more likely to fall into the "older plant" category created by S. 2203.

There is good reason why fewer new generating plants have been built in the Midwest than in other regions. The Midwest is disadvantaged not only because utilities in the region have tended to depend on nearby sources of coal that happen to have a high average sulfur content, but also because Midwest states have not shared in the pace of population and economic growth that has characterized other regions in the last several decades. These states are already hard pressed economically.

It is not fair and it is not acceptable to impose on these states devastatingly high expenses, expenses not essential to achieve substantial emission reductions, and then to add to that injury a national refusal to share the burden of cost for a national goal.

With respect to the recently introduced S. 2813, the Acid Deposition and Sulfur Emissions Reduction Act, because APPA was informed only on Monday of this week that the committee would consider testimony on legislation other than S. 2203, we have not had time to make a thorough analysis of it. Our initial reaction is that it contains a number of desirable provisions and that it would be very likely to cost substantially less to implement than other approaches being considered. It also has serious drawbacks.

Among the desirable provisions of S. 2813 are these. First, the bill calls for a two-phased process, with evaluation of certain options prior to implementation of the second phase. APPA would prefer a second phase to be initiated following affirmative action by the Congress, but we consider that the phased approach in S. 2813 is a step in the right direction.

Second, S. 2813 provides substantial flexibility both to the states and to EPA in details of implementation. This is desirable because optimal allocation of emission control investments requires detailed state and regional analysis, considering factors such as plant size, hours of operation, and fuel-switching opportunities that are far too intricate to be expressed in the statute, but yet are very important in ensuring that the large dollar amounts involved are effectively used.

Third, S. 2813 expressly provides for consideration of conservation efforts and for a targeted research program. Conservation is an important option because the desired end result is reduced acid deposition, not some particular level of plant emission ratios. And continued research is important because neither the technology of emission control nor the scientific understanding of acid deposition can be considered to be sufficiently well-developed to form the basis for a multibillion dollar national investment program.

While APPA finds these features of S. 2813 to be desirable, we must also point out our concern for the bill's failure to provide funding for sharing the costs of the program on a broad national basis. We believe that equity requires such sharing of costs. APPA also has some concern over the provisions of Section 187, which calls for plant-by-plant emission limitations if the implementation of state plans is not fully accomplished and approved. While we agree that some ultimate enforcement mechanism may be necessary, we believe that the bill should recognize that there may be special circumstances related to plant size, limited hours of operation, or severely limited supply alternatives under which the plant-by-plant emissions limits should be waived.

APPA also has some concern about the time schedules called for in S. 2813, and whether they impose impracticably short deadlines. We will comment further on this matter when we have had the opportunity to study the bill's provisions more thoroughly.

Thank you for the opportunity to testify today.

THOMAS R. KUHN, Executive Vice President

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October 28, 1986

The Honorable Robert T. Stafford, Chairman
Committee on Environment
and Public Works
United States Senate
Washington, D.C. 20510

Dear Mr. Chairman:

Following are answers to the written questions for the record, which were asked by Senator Burdick as a result of the September 25 acid rain hearing before your Committee:

1. Has your organization had the opportunity to evaluate the effect of S. 2813 on your industry as opposed to S. 2203? If so could you comment on the relative economic impact of the two bills on both your industry and on rate payers?

While we have not specifically evaluated the impact of S. 2813 on our industry and its customers, our consultant, Temple, Barker & Sloane, Inc., analyzed H.R. 4567, the closest House counterpart to S. 2813, as well as S. 2203. Copies of our consultant's reports on both analyses are enclosed for the record.

In summation, it can be said that S. 2203 is at least two to three times as expensive as H.R. 4567, a finding that essentially has been confirmed by all analysts who have examined the relative costs of both bills. (It should be pointed out that our analysis of H.R. 4567 was based on the bill as originally introduced; the change made in Subcommittee, from a "monthly" to an "annual" average allowable emission rate, would lower the 20-year levelized compliance cost from $5.4 billion to about $5.0 billion per year.)

Proponents of S. 2813 undoubtedly will emphasize differences between their bill and H.R. 4567, so it is appropriate to consider, at least qualitatively, the probable impact of such differences:

a. The Phase I compliance date in S. 2813 is 1992, whereas it is 1993 in H.R. 4567. Hence, although S. 2813 might force earlier commitments on compliance strategies and expenditures, the net cost difference would be nil or zero.

b. H.R. 4567 covers the entire U.S., S. 2813 only the 31 "Eastern" States. Overall compliance costs would be reduced about three percent by excluding "Western" States.

c. S. 2813 excludes from emission reduction requirements sources that are subject to New Source Performance Standards, but H.R. 4567 does not. The significance of this difference is not clear.

d. S. 2813 permits some special considerations and possible exemptions from NO_x controls, whereas H.R. 4567 specifies that statewide average NO_x emission limitations shall be met in all cases. This could lower NO_x compliance costs significantly in some States and on certain electric utility systems; but the bulk of control costs in any event is for SO_2 reductions, and the proportionate reduction would be small. (Also, in its analysis of H.R. 4567, Temple, Barker & Sloane assumed only that burner modifications would be required on units that could accommodate them, so the costs approximate what would be incurred under S. 2813.)

e. S. 2813 allows free trading of emission reductions, but H.R. 4567 limits trading to intrastate situations. While the Senate version would reduce compliance costs on interstate systems, the national impact would be small.

f. H.R. 4567 includes fees and subsidies, while S. 2813 does not. Fees were not included in the cost figures cited in the analysis of H.R. 4567, so the reported results would not change. Several analyses have shown that the subsidies in H.R. 4567 would benefit only three or four States and largely are a farce to garner political support for the bill.

g. Both bills hold out the possibility of changing or eliminating Phase II requirements, and both are a sham.

h. S. 2813 would require continuous emission monitoring, which would raise compliance costs by a modest proportion; H.R. 4567 has no comparable requirement. (For additional information on continuous emission monitors, refer to Question 3.)

2. Your industry has frequently commented, as you have today, that more time is needed to determine an approach to the acid rain problem. In what year do you think acid rain provisions should go into effect?

Probably the best answer to this question lies in historical review of the acid rain issue--how and when it was raised, what was proposed to cope with it, the current status of knowledge, and the predictions of cognizant officials.

At the White House level, acid rain first was raised as a potential issue in August 1979, when then-President Carter mentioned it in his Second Environmental Message to the Congress. He acknowledged that acid rain was a complex and poorly understood phenomenon, and he announced that he was forming an inter-agency task force, with an annual appropriation of $5 million, to study the matter for ten years and then report to the Congress with recommendations.

Three months later, Senator Daniel Patrick Moynihan, a distinguished Member of your Committee, formalized the President's proposal by introducing a bill with this explanation: "It will be possible to make profoundly gross mistakes here if we do not do some research first, mistakes that would cost billions... This is work for good brains, given a certain amount of resources and a certain amount of time."

Senator Moynihan's bill was passed and became Title VII of the Energy Security Act (Public Law 96-294), which was signed into law by President Carter in June 1980.

Just as the newly authorized Inter-Agency Task Force on Acid Precipitation was organizing to undertake the comprehensive research responsibilities that were specified in the law, a number of acid rain control bills were dropped in the hopper in the 1981 session of the 97th Congress. There had been no scientific breakthrough in the short span of a few months, and one could only wonder about the abrupt change of Congressional attitude which indicated that enough knowledge to justify costly controls suddenly had materialized.

Rapidly evolving science by public and private researchers over the next few years revealed that many of the early allegations of acid rain damage and theories about causes and effects were exaggerated, speculative, or wrong. Most importantly, nobody can give reasonable assurance, based on current scientific knowledge, that the proposed legislative solutions will reap benefits that even approach the tremendous projected costs.

At the very least, therefore, the ten-year research program delineated in the 1980 Moynihan bill should be allowed to run its course, else this nation could make a costly mistake. As Lee Thomas, Administrator of the Environmental Protection Agency, testified before your Committee, he presently does not have the necessary information on which to base a rational decision regarding acid rain control legislation. When pressed, he said two to three more years of research will be necessary, and the decision then might well be that no additional sulfur dioxide control measures are necessary. We concur in Mr. Thomas' position.

3. One of the most creative aspects of S. 2813 is the requirement that all power plants be retrofitted with continuous emission monitors in order to document compliance. Could you comment on the feasibility, time constraints, and economic impact of such a requirement?

The best estimate of the average cost to purchase and install a continuous emission monitoring (CEM) system on a single electric utility generating unit is $95,000 (in 1986 dollars). Some economies of scale can be expected for plants with more than one generating unit, but plant-specific variables make it practically impossible to estimate the reduced cost on a national basis.

Reported operation and maintenance (O&M) costs of CEM systems range widely, from $13,000 to $52,000 per year; based on utility company experience, we believe $40,000 is a reasonable estimate of annual O&M costs.

There are 1,348 fossil fuel-fired generating units in the "acid deposition impact region" established in S. 2813. Based on an industry survey, EEI estimates that less than ten percent of existing units currently have CEM systems. Therefore, a requirement to install CEM would impact 90 percent of existing units, and the total cost would be as follows:

Purchase and Installation: 0.9 x 1,348 x $95,000 = $115 million
Annual Operation and Maintenance: 0.9 x 1,348 x $40,000 = $49 million

It should be recognized that costs are independent of both generating capacity and age of a unit.

Questions regarding feasibility and time constraints are best addressed jointly. In today's market, if a utility company decided to purchase a CEM system for a single unit, a delivery time of six to eight months would be quoted. Over the past ten years, no more than 20 to 40 CEM systems were purchased in any one year, and no more than four or five suppliers were needed (or could be sustained) to meet the demand. Given the number of suppliers and their historical production records, EEI does not believe that sufficient capacity exists to manufacture and deliver over 1,000 CEM systems within the time frame contemplated by the bill.

Your Committee also should examine the necessity for a CEM requirement. Since SO$_2$ emissions are to be averaged on an annual basis for an entire State, alternatives to CEM exist for quantifying emissions. In fact, the only units that must monitor SO$_2$ stack emissions are those that elect to employ firebox (*e.g.*, limestone injection) or post-combustion (*e.g.*, scrubber) controls. Units that burn low-sulfur fuels (solid, liquid or gaseous) can demonstrate compliance through fuel sampling and analysis, which are routinely conducted by the electric utility industry, at a fraction of the cost of CEM systems. Therefore, the rigid CEM requirement in S. 2813 is neither necessary nor cost-effective.

The Honorable Robert T. Stafford, Chairman
October 28, 1986
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We appreciate the opportunity to supply this information for the record, and please do not hesitate to ask if we may provide additional assistance.

Sincerely,

Thomas R. Kuhn

TRK:wma
Enclosures
cc: Honorable Quentin N. Burdick w/enclosures
Honorable William Proxmire w/enclosures

NATIONAL COAL ASSOCIATION

Statement of

Carl E. Bagge
President

National Coal Association

before the

Committee on Environment and Public Works

United States Senate

September 25, 1986

My name is Carl E. Bagge. I am President of the National Coal Association. The National Coal Association represents producers of coal, both east and west, both low and high sulfur

The legislation now before the committee is the first of what should be termed third-generation acid rain control bills. In each generation, the connection to acid rain has become weaker and the main objective, more stringent SO_2 controls on non-NSPS power plants, has become stronger. First generation bills, such as S.768 & H.R.3400 considered in the last Congress, called for a reduction in aggregate SO_2 emissions of between 8 to 12 million tons. These reductions were apportioned among the states in a manner allegedly related to the states' relative contributions to acid rain. Upon examination however, it became evident that the required reductions were determined by the extent to which non-NSPS, or SIP-controlled plants, exceeded 1.2 lbs SO_2 per mmBtu, not by the extent of the state's contribution to observed effects of acidity. As we stated at the time, this was a thinly disguised attempt to impose a nationwide limit on SO_2 emissions from SIP-controlled plants which were otherwise in full compliance with all the requirements of the Clean Air Act and constituted no threat to public health or welfare.

The second generation bills are exemplified by H.R. 4567 currently before the House Energy and Commerce Committee and

S.2813, the Proximire-Humphrey bill. These are still labeled acid rain control bills, but there is no attempt to hide the imposition of more stringent controls on SIP-controlled power plants. All states must meet an average 2.0 lbs/mmBtu limit by 1992 and a 1.2 lb/mmBtu limit by 1997. This can be accomplished only by significantly ruducing SO_2 emissions at non-NSPS powerplants. The effect would be an 8-10 million ton aggregate SO_2 emission reduction.

The Stafford bill, S.2203, represents still another and third approach. The title is bold, the New Clean Air Act. Acid rain control, the driving force for amendment of the Clean Air Act in the last and this Congress is relegated to one of the many purposes of the Act. The future for SIP-controlled, non-NSPS plants is brutally clear. They will cease to exist in 1992. All plants will adopt NSPS controls or attain equivalent emission levels or they will be retired quickly. Thus, the generic label, "control or retire" for this type of proposal. We can now expect a spate of new studies all attempting to quantify the costs and effects of this proposal.

This latest approach, like its predecessors, is a proposal to impose a nationwide limit on emissions of SO_2 from sources not subject to new source performance standards without regard to whether such limit is required to protect public health or welfare. When all the new studies are completed, the proposed new approach, and the resulting reduction in aggregate SO_2 emissions, will be shown to be costly and to have little effect on the localized and limited instances of ecological distress which are the supposed beneficiaries of this or other legislation proposed to "control" acid rain by further reducing SO_2 emissions.

This legislation and the predecessors appear to be motivated in part by a perception that the Clean Air Act is not working or has ceased to be effective; and that, absent additional controls such as those proposed by S.2203 and S.2813, emissions of SO_2 will rise. This is an erroneous view of the efficacy of the Clean Air Act and of the trend in SO_2 emissions.

Earlier this year, the National Coal Association completed a detailed analysis and study of SO_2 emissions from coal-fired power plants from 1980 to 1985. Contrary to most forecasts, including that of EPA, we found that SO_2 emissions from coal-fired power plants have continued to decline, despite rising coal use. EPA has recently verified our findings with respect to the trend from 1980 to 1985, although they continue to disagree with us concerning the trend through 1990. With your permission, Mr. Chairman, I would submit these studies and our correspondence with EPA for inclusion in the record.

Our findings with respect to SO_2 emissions can be summerized quickly. Between 1980 and 1985, the nation did, in fact, see a significant increase in the use of coal by electric utilities. In 1985, electric utilities actually consumed 23% more coal than they did in 1980, some 125 million tons more coal. Notwithstanding this significant increase in coal consumption, emissions of SO_2 from coal-fired utility power plants actually declined by almost 3 percent or approximately a half million tons. The actual level of SO_2 emissions from coal-fired power plants in 1985 is not only some 10% below the EPA projection for 1985, but significantly below the 1980 level of emissions. This factually demonstrates that the trend observed and acknowledged by all during the 1970's, namely, declining emissions despite rising coal use, continues through the mid-point of the 1980's.

Any thought that the Clean Air Act is losing its efficacy with respect to reducing SO_2 emissions should be laid aside. This has been demonstrated through 1985, despite prediction to the contrary. Furthermore, many of the further requirements imposed by the 1977 Amendments have yet to take full effect. I refer particularly to the revised NSPS and PSD requirements.

The three generations of so-called acid rain control bills have been motivated by a desire to impose further controls on plants not subject to new source performance standards. There can be no question that such proposals will reduce SO_2 emissions even further. The proper question is do we need yet another layer of SO_2 emissions controls on top of 1) national ambient air quality standards, 2) state implementation plans, 3) new source performance standards and 4) prevention of significant deterioration requirements? As I noted before, the last two, adopted and tightened by Congress in 1977, have yet to take full effect.

It will no doubt be argued that some additional controls are needed to address the so-called life extensions of electric utility plants. This term refers to the possibility that additional investment in a generating plant will extend the life of the plant and therefore defer the significant additional investment that will be required to replace aging capital stock in the electric utility industry. This is entirely in keeping with recent trends to minimize capital expenditures by electric utilities in order to keep rates reasonable. Requiring that the plants be replaced, and not extended would place a significant additional capital requirement on electric utilities in the 1990's and the first decade of the 21st century as plants built in the 1960's and '70's require life-extending maintenance or replacement. This capital requirement would be additional to that needed to expand capacity to meet growing electricity demand.

The rub in this situation comes from the circumstance that extended plants might have higher per unit emissions than what would be required of a new plant meeting NSPS requirements.

However, not being subject to NSPS does not mean that the emissions are uncontrolled and that they pose any threat to health or welfare. All plants must and are complying with the emission limits imposed by state implementation plans which insure that each state meets the national ambient air quality standards which ensure that public health and welfare are protected with an adequate margin of safety. The plain fact is that these standards and goals do not require emission limits as stringent as those imposed by NSPS, not to mention PSD requirements.

Equivalent stringency can be imposed through the NAAQS and SIP's if the case can be made or if a state so chooses. However, to do so would increase the costs of generating electricity. Given existing requirements on SO_2 emissions, the trend of these emissions, and the weakness of the case for additional controls, it is not surprising that EPA has not required such controls, nor have many states opted to impose such controls on themselves.

Life extension is not an environmental problem. To treat it as such will only ensure that scarce capital resources will be conscripted from other needed uses and that consumers will pay more for electricity. On that basis, I urge that this third-generation attempt to impose an additional layer of controls on what is an already well controlled SO_2 emissions not be considered favorably by this committee or the Senate.

THE DOWNWARD TREND
IN
SULFUR DIOXIDE EMISSIONS
AT
COAL-FIRED ELECTRIC UTILITIES

1985 UPDATE

NATIONAL
COAL
ASSOCIATION

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HIGHLIGHTS

- Complete 1985 data confirm that SO_2 emissions from coal-fired power plants continue to decline despite rising coal use. Between 1980 and 1985, electric utility coal consumption increased by 23.0 percent, from 561 million tons to 690 million tons, while SO_2 emissions from these power plants declined by 2.7 percent, from 16.08 million tons to 15.65 million tons.

- Four factors are causing this decline in SO_2 emissions: new, lower-emitting plants are coming on line, demand for coal-fired power has shifted from higher- to lower-emitting regions, utilities are burning lower sulfur coal, and scrubbers have been added to existing capacity. As a result, the amount of SO_2 emitted per ton of coal burned declined by 4.6 percent between 1984 and 1985. This was the strongest decline in the last four years, and proof that the factors pushing emissions downward are still operating strongly.

- EPA's 1985 base case forecast of SO_2 emissions from coal-fired power plants is 17.23 million tons, significantly higher than what actually occurred. Only part of the error of that forecast is due to the higher demand for coal which they expected. The more significant increase concerns the extent to which EPA has failed to capture the continuing, significant decline in SO_2 emissions per ton of coal consumed, due in large part to the continued efficacy of the Clean Air Act.

- In light of the 1985 data and analysis of the trends evident from 1980 to 1985, EPA's forecast of rising SO_2 emissions after 1980 needs to be revised, not only for 1985 which is history, but also for 1990 in view of diminished growth in the use of coal by electric utilities and the continuing decline in the amount of SO_2 emitted per ton of coal combusted. Such a revision could very likely show that emissions will not be higher in 1990 than they were in 1980.

BACKGROUND

Sulfur dioxide emissions have declined by 26 percent since their peak in 1973 through 1984, according to data calculated and recently released by the Environmental Protection Agency. Notwithstanding this declining trend, EPA's base case projection of SO2 emissions from coal-fired power plants shows rising emissions throughout the 1980's and beyond. Implicit in this projection of rising emissions is the theory that further reductions in SO2 emissions are not possible at existing power plants. Therefore, as demand for coal-fired power increases, and new power plants become operational, total emissions will increase.

In order to resolve differences between EPA's calculations of declining emissions and EPA's projections of rising emissions, NCA studied SO2 emissions from coal-fired power plants between 1980 and 1984. NCA combined yearly Department of Energy data covering those power plants with capacity greater than 50 megawatts with scrubber capacity information. The data included coal consumption, and sulfur content and Btu value of coal deliveries for each power plant. Calculations of SO2 emissions at each power plant for each year were then made, assuming that all sulfur in the coal burned converts to SO2 except for five percent retained in the ash, and that scrubbers operate at seventy percent efficiency.

These calculations showed between 1980 and 1984 a 2.2 percent decline in SO2 emissions from coal-fired power plants in spite of a 17.7 percent increase in coal consumption over the same time period. The amount of SO2 emitted per million Btu of coal burned declined 16 percent, from 2.68 pounds in 1980 to 2.26 pounds in 1984.

NCA identified four factors causing the decline in emissions:

- the NSPS effect, which reflects the lower emissions rates of new plants and plant additions;
- the demand effect, which captures regional changes in demand for coal-fired power;
- the sulfur effect, which captures the changes in emissions resulting from individual power plants, on average, burning lower sulfur coal,
- scrubber effect, which reflects the additions of scrubbers to existing plants.

The final phase of NCA's study extrapolated emissions from coal-fired power plants to 1990, based on NCA's electric utility coal consumption forecast, and on the continuation of the four factors identified in the analysis. NCA's extrapolations ranged from 11.6 million tons of SO2 to 14.7 million tons, all significantly below EPA's base case forecast of emissions for 1990, and actual emissions in 1980 and 1985.

A more complete discussion of NCA's methodology and 1980 - 1984 results are set forth in the original study. This overview serves as an introduction to the 1985 study results. Summary data for the years 1980 through 1985 are attached as an appendix to the study.

ANALYSIS OF SO2 EMISSIONS: 1980 - 1985

All of the conclusions from the 1980 - 1984 study are confirmed by the 1980 - 1985 analysis. SO2 emissions from coal-fired power plants fell 2.7 percent while utility coal consumption increased by 23.0 percent. The amount of SO2 emitted per million Btu of coal burned declined 19.8 percent, the average sulfur content of the coal declined from 1.63 percent to 1.40 percent, and the ratio of coal generation subjected to flue gas desulfurization (scrubbing) increased by 73.1 percent.

	1980	1985	% Change
Coal Use (million tons)	561	690	23.0%
SO2 Emissions (million tons)	16.08	15.65	- 2.7%
Lbs. SO2/MMBtu	2.68	2.15	-19.8%
% Sulfur	1.63	1.40	-14.1%
% Of Coal Scrubbed	12.85%	22.24%	73.1%

The breakdown between new plants and continuing plants again shows that while most of the increase in coal tons burned by power plants is attributable to new plants, the decrease in SO2 emissions at continuing plants is significant and more than enough to compensate for the increase in emissions at new plants.

	Coal Use (millions tons)	SO2 Emissions (millions tons)
1980 Actual	561.4	16.08
New Plants	+106.4	+ .91
1980 Plants	+ 22.7	-1.35
Continuing	+ 23.7	-1.32
Retired/Not Used	- 1.0	- .03
1985 Actual	690.4	15.65
Net Change	+129.0	- .43

New plants, including plants converted to burn coal and additions to existing plants, accounted for 106.4 million of the 129.0 million ton increase in coal burned in 1985 compared with 1980, and produced .91 million tons of SO2 emissions. Continuing plants were used more intensively, consuming 22.7 million tons more coal, but they emitted 1.35 million fewer tons of SO2 in 1985 than in 1980. On a nationwide basis,the significant reduction in emissions at continuing plants more than offset the increase in emissions at new plants.

The analysis of the four factors causing the decline in emissions which was made for the 1980 - 1984 data was repeated for the 1980 - 1985 data. First a hypothetical comparison case was developed which shows what the level of SO2 emissions would have been in 1985 had no changes in coal burning at power plants been made since 1980 except for the increase in aggregate demand. In this hypothetical, "frozen world" case, plant and scrubber capacity and sulfur content of the coal burned remain at 1980 levels, and the increase in demand is applied uniformly to all plants.

Under these conditions, SO2 emissions from coal-fired power plants would have risen from 16.08 million tons in 1980 to 19.78 million tons in 1985. In fact emissions in 1985 were 15.65 million tons, leading to a reduction for comparison purposes of 4.13 million tons. This 4.13 million tons savings is accounted for by the four factors previously named: the NSPS effect, the demand effect, the sulfur effect and the scrubber effect.

The category of new plants includes all plants and plant additions which became operational between 1980 and 1985. This included 54 plants with aggregate capacity of 30.48 gigawatts, and 16 plant expansions with aggregate capacity of 9.17 gigawatts. These plants consumed 106.4 million tons of coal in 1985, 48% of which was scrubbed. The average sulfur content of the coal was .87%, and SO2 emissions from these plants totaled 908 thousand tons in 1985, resulting in a pounds SO2 per million Btu ratio of .92. These averages are a substantial improvement over the average 1980 plant, reflecting the effect of environmental regulations.

To determine the magnitude of the NSPS factor, NCA compared actual 1985 emissions from new plants with the amount of SO2 that would have been produced by the same amount of coal if it had been burned in plants existing in 1980. This amount was calculated by weighing the average SO2 percent in 1980 for each region by its coal consumption by new plants in 1985. The calculations were made on a regional basis, rather than using the national aggregate, because new plants were not geographically distributed the same way as 1980 plants. The regions used in NCA's analysis are based on North American Electric Reliability Council regions.

	Coal Burned by New Plants		1980	SO2 Emissions
	Million Tons	% of Total	Avg. SO2%	Million Tons
Northeast	5.337	5.02	3.53	.19
East North Central	16.423	15.44	3.71	.61
Southeast	14.310	13.45	3.27	.47
West North Central	7.341	6.90	1.47	.11
West South Central	41.642	39.14	1.76	.73
West	21.330	20.05	.87	.18
Total	106.383	100.00	2.87	2.29

The above table shows that if new plants had not been in place and the electricity supplied by them in 1985 been produced by the more intensive use of 1980 plants with 1980 emission rates, SO2 emissions of 2.29 million tons would have resulted. Actual emissions by new plants in 1985 were .91 million tons. The difference of 1.38 million tons represents the emissions reduction attributable to New Source Performance standards.

As previously shown, total SO2 emissions in the "comparison" case would have been 19.78 million tons. Subtracting the 2.29 million tons associated with the coal burned in new plants leaves 17.49 million tons of SO2 associated with continuing plants.

Next the demand effect was quantified by applying the emissions formula to each continuing plant, using the 1985 coal consumption of each plant, but leaving the sulfur content and scrubber capacity at the 1980 level. Total emissions under this scenario were 16.30 million tons, compared with 17.49 million tons calculated in the comparison case after accounting for new plants. The difference of 1.19 million tons represents the reduction in emissions because of the shift in demand for coal-fired power from higher- to lower-SO2 emitting regions and power plants.

Next the 1985 sulfur content was factored into the emissions equation for each plant. This resulted in SO2 emissions of 15.21 million tons, a difference of 1.09 million tons from the demand shift level of 16.30 million tons. This reduction is attributable to the change in sulfur content of the coal burned at each plant.

When the scrubber capacity of each plant is set at its 1985 level, the result is actual 1985 emissions for continuing plants: 1985 coal tonnage, 1985 sulfur content and 1985 scrubber capacity. Continuing plants produced 14.74 million tons of SO2 in 1985, a reduction of .47 million tons from the sulfur shift level of 15.21. The relative magnitude of the four factors is as follows:

	Million Tons SO2	% of Total
NSPS Effect	1.38	33.5%
Continuing Plants		
Demand Shift	1.19	28.8%
Sulfur Shift	1.09	26.4%
Scrubber Effect	.47	11.3%
Total	4.13	100.0%

As previously shown, 82.5 percent of the 129 million ton increase in coal consumption between 1980 and 1985 was at new power plants. This analysis reveals that 66.5 percent of the decrease in SO2 emissions was attributable to continuing plants, in sharp contrast to EPA's theory that further reductions in SO2 emissions at continuing plants would not occur.

NCA expects the four factors identified in its analysis to continue to influence SO2 emissions at least through 1990. New plants will still be subject to New Source Performance Standards. As a matter of fact, the more stringent standards required for plants on which construction began after September, 1978, will be applied to a larger portion of the plants scheduled for completion by the end of this decade, thereby intensifying the NSPS effect.

The factors reducing emissions at continuing plants should also remain in effect. The Bureau of the Census projects that population movement from the Frostbelt to the Sunbelt will continue through 1990. The addition of nuclear capacity and growth in Canadian exports of power to the Northeast and East North Central regions between 1985 and 1990 will also limit growth in coal-fired generation in those areas. Additional scrubber retrofits are planned for the rest of the decade, and the trend towards burning lower sulfur coal shows no sign of easing.

NCA's long range forecast of utility coal consumption predicts slower growth for the rest of the decade, estimating 1990 coal consumption at 726 million tons. The assumptions causing slower growth are increased nuclear capacity and higher capacity factors for nuclear plants, greater power imports and use of cogeneration, and competitive oil and gas prices. These factors will all act to reduce coal's share of the electric generation market.

The slower coal growth in the future should further slow the emissions trend given that the four factors NCA identified remain in effect. The decline in the average SO2 emissions per ton of coal consumed over the 1980 to 1985 time period averaged 4.58 percent per year. This is almost identical to the 1980 to 1984 annual average decline of 4.57 percent per year. The average SO2 percent is an input/output ratio, measuring the amount of SO2 emitted per ton of coal burned. It is useful in evaluating the trend in SO2 emissions because it eliminates the effect of year to year tonnage variations on total emissions, and captures the effect of those factors which are reducing emissions in spite of the growth in coal demand.

NCA used the trend in average SO2 percent combined with the NCA coal forecast to extrapolate SO2 emissions to 1990. Since the average annual decline in the SO2 percent between 1980 and 1985 was virtually identical to the results in the 1980 - 1984 time period, NCA's extrapolation of SO2 emissions remains the same as in our earlier study. These extrapolations are based on the revitalization, moderate growth and stagnation scenarios of NCA's forecast, and on "less optimistic" and "more optimistic" assumptions concerning the SO2 percent.

	--------------------Assumptions	-----------	----Results-----
Case	1990 Utility Coal Use (Million Tons	SO2/Coal Ratio Ann.Rate of Change	Est.SO2 Emissions (Million Tons)
High	767	-3.6	14.65
Mid	726	-4.6	13.07
Low	688	-5.6	11.62

The SO2/coal ratios are those observed between 1982-84 (-3.6 percent), 1980-84 and 1980-85 (-4.6 percent) and 1973-84 (-5.6 percent). In the high emission case resulting from stronger coal growth and less reduction in the SO2/coal ratio, total SO2 emissions still decline as the faster coal growth is not sufficient to overwhelm the slower but still significant reduction in the SO2/coal ratio.

ANALYSIS OF SO2 EMISSIONS: 1984 - 1985

Although it is often misleading to attempt to detect trends in year to year data, comparing the 1984 and 1985 results does provide additional insight into what is happening to SO2 emissions. NCA's previous analysis looked at changes in coal consumption, SO2 emissions and the average SO2 percent over several years. One question raised by this data was whether the rate of change of the average SO2 percent was slowing as the 1980's progressed. As the chart below shows, the 1984-85 decline in average SO2 percent was greater than in the three previous year-to-year periods, indicating that the factors causing reductions in emissions are still operating strongly.

Year	Coal Consumption (million tons)	SO2 Emissions (million tons)	Average SO2 Percent	
			SO2/ Tons Coal	% Change From Previous Year
1973	369.0	16.52	4.48%	--
1980	561.4	16.08	2.87%	--
1981	592.6	15.85	2.67%	-7.0%
1982	589.5	15.09	2.56%	-4.1%
1983	620.9	15.25	2.46%	-3.9%
1984	660.9	15.72	2.38%	-3.3%
1985	690.4	15.65	2.27%	-4.6%

A comparison of the strength of each factor in the 1980-84 and 1980-85 periods shows that the NSPS effect is becoming more important. This is logical as over time more and more of the increase in tonnage will be at post-1980 plants. In the 1980-84 period 78 percent of the tonnage increase and 26 percent of the decline in SO2 emissions was attributable to new plants, compared to 82 percent of the tonnage increase and 34 percent of the decline in SO2 emissions attributable to new plants in the 1980-85 period.

The NSPS, demand shift, sulfur shift and scrubber effects all acted to reduce emission levels between 1984 and 1985. Three new plants, totaling 1214 megawatts, and 7 plant additions, totaling 3675 megawatts, became operational between 1984 and 1985. These new plants consumed 9.443 million tons of coal and produced 85 thousand tons of SO2 emissions. The average sulfur content of the coal burned was .79 percent, and the plants emitted .92 pounds of SO2 per million Btu. This is a substantial improvement over the average plant operating in 1984, which burned coal with a 1.44 percent sulfur content and emitted

2.26 pounds of SO2 per million Btu. It is also an improvement over the average of the new plants in the 1980 - 1984 analysis which in 1984 burned coal with a .88 percent sulfur content and emitted .98 pounds SO2 per million Btu.

The plants burning coal in both 1984 and 1985 (continuing plants) increased their consumption of coal by 20 thousand tons, or 3.0 percent, but decreased their emissions of SO2 from 15.69 million tons to 15.56 million tons, a decline of 0.8 percent. Pounds of SO2 per million Btu fell from 2.26 to 2.17.

The shift to lower sulfur coals continued as average sulfur content of coal burned at continuing plants fell from 1.44 in 1984 to 1.41 in 1985. Scrubbers were added to two units of Arizona Public Service Company's Four Corners plant, an addition of 1490 megawatts of retrofitted scrubber capacity.

The shift in demand from the Frostbelt to the Sunbelt region also shows up in the 1984-85 data. Market share for the East North Central region, which is composed of Illinois, Indiana, Michigan, Ohio, West Virginia and most of Kentucky and Wisconsin, declined once again, and the West South Central region, composed of Texas, Louisiana, Oklahoma, Arkansas, Karsas and the western half of Missouri, increased its market share.

	Market Share of 1984-85 Continuing Plants	
	1984 Share	1985 Share
Northeast	8.1%	8.1%
East North Central	35.0	33.8
Southeast	18.0	19.0
West North Central	7.8	7.6
West South Central	18.7	19.1
West	12.4	12.4

The Southeast region also increased its market share substantially. However a significant part of this increase was because of the shutdown of two Tennessee Valley Authority nuclear plants during 1985, and the resultant large rise in coal-fired generation by TVA plants. TVA's Brown's Ferry 3450 megawatt nuclear plant was shut down from April through December, and TVA's Sequoyah 2450 megawatt nuclear plant was shut down from September through December. Coal consumption by TVA plants increased 15.6 percent over 1984 levels compared to a 3.0 percent increase in the Southeast region overall.

It should be noted that the demand effect also captures changes in demand between plants in the same region. For example 1984-85 continuing plants in the Northeast consumed 53.212 million tons of coal and emitted 1.65 million tons of SO2 in 1984. When coal consumption at each plant is set at its 1985 level and scrubber capacity and sulfur percent are held constant, total consumption in the Northeast for continuing plants rises to 54.861 million tons, but SO2 emissions remain at 1.65 million tons. If emissions do not increase in spite of a 3.1 percent increase in coal burned, with all other factors held constant, coal consumption must be shifting towards lower emitting plants.

This same shift towards lower emitting plants is revealed if the same analysis is made for the East North Central region. Changing coal consumption at each continuing plant from its 1984 to 1985 level and holding all other factors constant resulted in an 0.6 percent decrease in consumption and a 1.5 percent decrease in SO2 emissions. These intra-regional shifts show that utilities are using newer, more efficient, and lower emitting plants more intensively.

COMPARISON OF NCA RESULTS AND EPA BASE CASE

EPA's base case projections of SO2 emissions from coal-fired power plants were made in five year increments from 1980, and showed rising emissions throughout the 1980's and beyond. Now that 1985 data is available it is appropriate to test EPA's predictions. The following chart compares EPA's base case with NCA's study.

	Tons of Coal Burned (millions)		Tons of SO2 Emitted (millions)	
	EPA	NCA	EPA	NCA
1980	569	561	16.02	16.08
1985	717	690	17.23	15.65
1990	784	726	17.89	13.07

EPA started with 1980 emissions estimates and projected 1985 tonnage and emissions for coal-fired utilities. NCA's study was made on coal-fired power plants, 50 megawatts and greater, which accounted for 99 percent of coal burned by power plants. The 1980 and 1985 coal tons are actual numbers, and the 1980 and 1985 emissions were calculated by NCA. It is clear that NCA's methodology for calculating historical emissions produces results very close to EPA's historical estimates as evidenced by the 1980 data.

EPA's base case forecasts an increase of 7.6 percent or 1.21 million tons of SO2 from 1980 to 1985, and an increase of 3.8 percent or .66 million tons of SO2 from 1985 to 1990. The first five year increment of its forecast is clearly wrong: EPA's base case overestimated 1985 coal consumption by four percent and 1985 SO2 emissions by ten percent. This implies that EPA not only erred in its assumptions about coal consumption, but also miscalculated the extent of the decline in average SO2 percent, which is the ratio of SO2 emitted per ton of coal burned. This ratio captures the effect of all the factors influencing emissions rates. The following table compares the implicit assumptions contained in the EPA and NCA analyses. The percentages express annual rates of change.

Years	Utility Coal Consumption	SO2/Coal Ratio	Aggregate SO2 Emissions
EPA Base Case:			
1980-85	+4.73%	-3.12%	+1.47%
1985-90	+1.80%	-1.03%	+0.75%
NCA Historical Data:			
1980-85	+4.05%	-4.58%	-0.55%
NCA Extrapolation:			
1985-90	+0.91%	-4.58%	-3.54%

EPA has reviewed NCA's 1980-84 emissions study and produced a document analyzing the differences between the NCA and EPA estimates for 1990. In that document, EPA accepted NCA's 1984 emissions estimate of 15.72 million tons of SO2. However, even though this 1984 figure was far from EPA's 1985 estimate of 17.23 million tons, EPA has stuck with its 1990 estimate. Instead of the 0.66 million ton increase in SO2 emissions originally projected in EPA's base case between 1985 and 1990, EPA is now calling for a 2.2 million ton increase in SO2 emissions between 1984 and 1990.

EPA has overestimated coal consumption and underestimated the decline in the SO2/coal ratio between 1980 and 1985. Its latest adjustments to its base case simply push these mis-estimations into the 1985-1990 time period: the rate of coal growth has been increased and the rate of change in the SO2/coal ratio has gone from negative to positive.

The underlying reasons for NCA's and EPA's views of the future are differing assumptions about (1) oil prices and the resulting effect on coal's share of the utility market, (2) the prospective demand in the metallurgical and industrial markets and (3) the appearance and magnitude of sulfur premiums. EPA predicts oil prices of $29.20/bbl. (1985 dollars) in 1990, which causes coal to replace oil and gas in both the electric utility and industrial market. This stronger demand leads EPA to assume a tightening of coal markets, particularly for lower sulfur coals, and a resulting higher premium paid for low sulfur coal. Thus EPA projects that utilities will switch back to higher sulfur coals.

NCA does not see the backout of oil and gas by coal; its coal forecast was based on lower oil prices and thus stronger interfuel competition. NCA predicts lower demand for coal in the steel and industrial markets as well. Therefore it does not expect a tightening of coal markets, nor a premium for low sulfur coal to develop. In addition, engineering and geological factors appear to have made lower sulfur coals more available than had been previously anticipated, so that it is not clear that higher premiums for low sulfur coal would appear even if demand were greater than NCA expects.

CONCLUSION

The addition of 1985 data to NCA's study confirms that the trend towards lower SO2 emissions is still firmly in place. Further, the 1985 data make it desirable that EPA revise the Base Case Forecast to remove the discrepancy between actual emissions and its 1985 estimate, and to reassess the underlying assumptions in its 1990 forecast in light of the 1980-85 data.

APPENDIX
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1980 plants consuming coal

	1980 Tons Coal	80 Coal T Scr	80 T SO2 Em	1980 T Sul	1980 mbtu	% Tons Scrubbed	Ave.SO2% (Tons Emit/ Tons Cons.)	Average Sulfur	Lbs.SO2/ Mbtu
Total	561,356,691	72,110,836	16,084,266	9,152,993	6,005,013	12.85%	2.87%	1.63%	2.68

	1980 Tons Coal	80 Coal T Scr	80 T SO2 Em	1980 T Sul	1980 mbtu	% Tons Scrubbed	Ave.SO2% (Tons Emit/ Tons Cons.)	Average Sulfur	Lbs.SO2/ Mbtu
ECAR	161,293,822	13,986,691	6,200,403	3,578,885	1,868,234	8.67%	3.84%	2.22%	3.32
ERCOT	39,557,089	15,370,908	317,854	255,124	282,076	38.86%	0.80%	0.64%	1.13
MAAC	38,510,991	0	1,354,629	712,963	472,259	0.00%	3.52%	1.85%	2.87
MAIN	59,687,283	3,324,306	1,988,369	1,115,508	626,114	5.57%	3.33%	1.87%	3.18
MAPP	42,403,000	11,022,150	623,606	385,282	354,400	25.99%	1.47%	0.91%	1.76
NPCC	8,202,771	0	292,532	153,964	102,953	0.00%	3.57%	1.88%	2.84
SERC	116,369,976	2,990,896	3,804,795	2,031,076	1,392,627	2.57%	3.27%	1.75%	2.73
SPP	32,952,746	7,504,891	959,477	558,774	309,683	22.77%	2.91%	1.70%	3.10
WSCC	62,379,013	17,910,994	542,600	361,418	596,666	28.71%	0.87%	0.58%	0.91
Total	561,356,691	72,110,836	16,084,266	9,152,993	6,005,013	12.85%	2.87%	1.63%	2.68
Northeast	46,713,762	0	1,647,161	866,927	575,213	0.00%	3.53%	1.86%	2.86
East North Cen	220,981,105	17,310,996	8,188,772	4,694,394	2,494,348	7.83%	3.71%	2.12%	3.28
Southeast	116,369,976	2,990,896	3,804,795	2,031,076	1,392,627	2.57%	3.27%	1.75%	2.73
West North Cen	42,403,000	11,022,150	623,606	385,282	354,400	25.99%	1.47%	0.91%	1.76
West South Cen	72,509,835	22,875,799	1,277,332	813,898	591,759	31.55%	1.76%	1.12%	2.16
West	62,379,013	17,910,994	542,600	361,418	596,666	28.71%	0.87%	0.58%	0.91
Total	561,356,691	72,110,836	16,084,266	9,152,993	6,005,013	12.85%	2.87%	1.63%	2.68

Coal Plants: 1981

	CONSUMP	T SCR	SO2 EMIT	T SULFUR	MBTU	% Tons Scrubbed	Ave SO2 (Tons Emit/ Tons Cons.)	Average Sulfur	Lbs. SO2 MBTU
ECAR	163,830,155	17,725,496	6,107,454	3,605,062	1,894,728	10.82%	3.73%	2.20%	3.22
ERCOT	44,386,513	16,218,555	295,805	249,335	324,079	36.54%	0.67%	0.56%	0.91
MAAC	36,476,469	0	1,250,851	658,343	445,855	0.00%	3.43%	1.80%	2.81
MAIN	58,361,354	3,009,250	1,841,531	1,034,361	610,530	5.16%	3.16%	1.77%	3.02
MAPP	45,594,245	13,670,873	540,669	352,484	374,619	29.98%	1.19%	0.77%	1.44
NPCC	8,192,962	0	291,599	153,473	101,782	0.00%	3.56%	1.87%	2.86
SERC	119,404,403	4,215,427	3,932,219	2,107,566	1,427,876	3.53%	3.29%	1.77%	2.75
SPP	44,894,298	8,460,806	1,026,485	596,048	411,193	18.85%	2.29%	1.33%	2.50
WSCC	71,452,429	24,917,404	562,488	392,866	687,625	34.87%	0.79%	0.55%	0.82
Total	592,592,828	88,217,812	15,849,100	9,149,538	6,278,286	14.89%	2.67%	1.54%	2.52
Northeast	44,669,431	0	1,542,450	811,816	547,637	0.00%	3.45%	1.82%	2.82
East North Cen	222,191,509	20,734,746	7,948,985	4,639,423	2,505,258	9.33%	3.58%	2.09%	3.17
Southeast	119,404,403	4,215,427	3,932,219	2,107,566	1,427,876	3.53%	3.29%	1.77%	2.75
West North Cen	45,594,245	13,670,873	546,669	352,484	374,619	29.98%	1.19%	0.77%	1.44
West South Cen	89,280,811	24,679,361	1,322,290	845,383	735,272	27.64%	1.48%	0.95%	1.80
West	71,452,429	24,917,404	562,488	392,866	687,625	34.87%	0.79%	0.55%	0.82
Total	592,592,828	88,217,812	15,849,100	9,149,538	6,278,286	14.89%	2.67%	1.54%	2.52

COAL PLANTS;1982

	TONS CONS	T SCR	SO2 EMIT	T SULFUR	MBTU	% Tons Scrubbed	Ave. SO2 % (Tons Emit/ Tons Cons.)	Average Sulfur	Lbs. SO2 /MBTU
ECAR	155,181,057	18,813,792	5,773,303	3,458,745	1,813,038	12.12%	3.72%	2.23%	3.18
ERCOT	48,168,525	19,966,306	367,625	335,105	350,233	41.45%	0.76%	0.70%	1.05
MAAC	37,293,976	0	1,228,125	646,382	456,975	0.00%	3.29%	1.73%	2.69
MAIN	56,340,919	2,180,706	1,845,653	1,018,733	588,377	3.87%	3.28%	1.81%	3.14
MAPP	44,937,539	14,719,827	537,489	352,718	364,987	32.76%	1.20%	0.78%	1.47
NPCC	10,802,532	0	353,381	185,990	137,674	0.00%	3.27%	1.72%	2.57
SERC	109,679,500	4,618,841	3,366,464	1,817,401	1,319,264	4.21%	3.07%	1.66%	2.55
SPP	52,667,189	8,848,976	1,038,437	607,375	474,069	16.80%	1.97%	1.15%	2.19
WSCC	74,397,813	27,588,833	575,752	411,684	718,391	37.08%	0.77%	0.55%	0.80
Total	589,469,050	96,737,281	15,086,229	8,834,133	6,223,007	16.41%	2.56%	1.50%	2.42
Northeast	48,096,508	0	1,581,506	832,372	594,648	0.00%	3.29%	1.73%	2.66
East North Cen	211,521,976	20,994,498	7,618,956	4,477,478	2,401,414	9.93%	3.60%	2.12%	3.17
Southeast	109,679,500	4,618,841	3,366,464	1,817,401	1,319,264	4.21%	3.07%	1.66%	2.55
West North Cen	44,937,539	14,719,827	537,489	352,718	364,987	32.76%	1.20%	0.78%	1.47
West South Cen	100,835,714	28,815,282	1,406,062	942,480	824,302	28.58%	1.39%	0.93%	1.71
West	74,397,813	27,588,833	575,752	411,684	718,391	37.08%	0.77%	0.55%	0.80
Total	589,469,050	96,737,281	15,086,229	8,834,133	6,223,007	16.41%	2.56%	1.50%	2.42

COAL PLANTS: 1983

	TONS	COAL SCR	SO2 EMIT	T SULF	MBTU	% Tons Scrubbed	Ave.SO2 % (Tons Emit/ Tons Cons.)	Average Sulfur	Lbs. SO2 /MBTU
ECAR	159,410,308	21,765,830	5,796,343	3,508,996	1,875,340	13.65%	3.64%	2.20%	3.09
ERCOT	54,605,050	26,035,756	398,042	378,092	392,977	47.68%	0.73%	0.69%	1.01
MAAC	39,787,418	689,816	1,245,851	663,704	492,235	1.73%	3.13%	1.67%	2.53
MAIN	60,814,430	2,580,415	1,952,329	1,076,162	633,760	4.24%	3.21%	1.77%	3.08
MAPP	47,162,945	16,191,870	523,357	350,974	381,304	34.33%	1.11%	0.74%	1.37
NPCC	11,142,693	0	355,290	186,995	142,908	0.00%	3.19%	1.68%	2.49
SERC	112,568,486	5,431,191	3,414,934	1,862,758	1,363,583	4.82%	3.03%	1.65%	2.50
SPP	62,676,403	12,401,560	996,940	636,693	564,737	19.79%	1.59%	1.02%	1.77
WSCC	72,730,388	28,496,444	565,720	411,990	701,956	39.18%	0.78%	0.57%	0.81
Total	620,898,121	113,592,882	15,248,807	9,076,364	6,548,799	18.29%	2.46%	1.46%	2.33
Northeast	50,930,111	689,816	1,601,141	850,699	635,143	1.35%	3.14%	1.67%	2.52
East North Cen	220,224,738	24,346,245	7,748,672	4,585,158	2,509,100	11.06%	3.52%	2.08%	3.09
Southeast	112,568,486	5,431,191	3,414,934	1,862,758	1,363,583	4.82%	3.03%	1.65%	2.50
West North Cen	47,162,945	16,191,870	523,357	350,974	381,304	34.33%	1.11%	0.74%	1.37
West South Cen	117,281,453	38,437,316	1,394,982	1,014,785	957,714	32.77%	1.19%	0.87%	1.46
West	72,730,388	28,496,444	565,720	411,990	701,956	39.18%	0.78%	0.57%	0.81
Total	620,898,121	113,592,882	15,248,807	9,076,364	6,548,799	18.29%	2.46%	1.46%	2.33

1984 coal plants

	1984 Tons Coal	84 Coal T Scr	84 T SO2 Em	1984 T Sul	1984 mbtu	% Tons Scrubbed	Ave.SO2% (Tons Emit/ Tons Cons.)	Average Sulfur	Lbs.SO2 MBTU
Total	660,879,992	134,092,081	15,724,123	9,545,433	6,956,391	20.29%	2.38%	1.44%	2.26

	1984 Tons Coal	84 Coal T Scr	84 T SO2 Em	1984 T Sul	1984 mbtu	% Tons Scrubbed	Ave.SO2% (Tons Emit/ Tons Cons.)	Average Sulfur	Lbs.SO2 MBTU
ECAR	170,859,935	25,506,814	6,103,400	3,747,477	2,003,018	14.93%	3.57%	2.19%	3.05
ERCOT	56,460,274	27,088,960	382,665	362,100	402,737	47.98%	0.68%	0.64%	0.95
MAAC	40,588,153	975,038	1,258,717	674,741	505,036	2.40%	3.10%	1.66%	2.49
MAIN	60,401,792	2,604,171	1,910,736	1,053,568	633,397	4.31%	3.16%	1.74%	3.02
MAPP	51,727,055	19,484,829	569,332	402,735	413,876	37.67%	1.10%	0.78%	1.38
NPCC	12,623,928	631,579	389,829	217,066	162,164	5.00%	3.09%	1.72%	2.40
SERC	118,994,316	7,964,731	3,412,884	1,916,491	1,445,246	6.69%	2.87%	1.61%	2.36
SPP	67,239,261	14,486,359	1,077,587	697,343	604,465	21.54%	1.60%	1.04%	1.78
WSCC	81,985,278	35,349,600	618,974	473,913	786,453	43.12%	0.75%	0.58%	0.79
Total	660,879,992	134,092,081	15,724,123	9,545,433	6,956,391	20.29%	2.38%	1.44%	2.26

Northeast	53,212,081	1,606,617	1,648,546	891,807	667,200	3.02%	3.10%	1.68%	2.47
East North Cen	231,261,727	28,110,985	8,014,136	4,801,044	2,636,415	12.16%	3.47%	2.08%	3.04
Southeast	118,994,316	7,964,731	3,412,884	1,916,491	1,445,246	6.69%	2.87%	1.61%	2.36
West North Cen	51,727,055	19,484,829	569,332	402,735	413,876	37.67%	1.10%	0.78%	1.38
West South Cen	123,699,535	41,575,319	1,460,252	1,059,443	1,007,202	33.61%	1.18%	0.86%	1.45
West	81,985,278	35,349,600	618,974	473,913	786,453	43.12%	0.75%	0.58%	0.79
Total	660,879,992	134,092,081	15,724,123	9,545,433	6,956,391	20.29%	2.38%	1.44%	2.26

Coal Plants: 1985

	T CONS	T SCR	T SO2 EMIT	T SULFUR	MBTU	% Tons Scrubbed	Ave. SO2% (Tons Emit/ Tons Cons.)	Average Sulfur	Lbs.SO2/ MBTU
ECAR	175,744,474	26,776,023	5,970,719	3,711,486	2,055,963	15.24%	3.40%	2.11%	2.90
ERCOT	57,139,596	28,418,220	389,548	366,754	406,055	49.73%	0.68%	0.64%	0.96
MAAC	41,004,926	969,339	1,222,884	653,783	511,656	2.36%	2.98%	1.59%	2.39
MAIN	57,979,268	2,790,488	1,767,132	982,290	609,562	4.81%	3.05%	1.69%	2.90
MAPP	51,738,369	19,443,693	574,001	411,436	413,392	37.58%	1.11%	0.80%	1.39
NPCC	13,856,909	1,568,510	385,507	230,567	178,952	11.32%	2.78%	1.66%	2.15
SERC	131,275,367	11,853,504	3,729,210	2,154,829	1,592,219	9.03%	2.84%	1.64%	2.34
SPP	75,147,155	16,358,917	1,031,326	688,575	662,486	21.77%	1.37%	0.92%	1.56
WSCC	86,506,882	45,398,427	576,739	490,477	832,534	52.48%	0.67%	0.57%	0.69
Total	690,392,946	153,577,121	15,647,066	9,690,197	7,262,820	22.24%	2.27%	1.40%	2.15
Northeast	54,861,835	2,537,849	1,608,391	884,350	690,608	4.63%	2.93%	1.61%	2.33
East North Cen	233,723,742	29,566,511	7,737,851	4,693,776	2,665,525	12.65%	3.31%	2.01%	2.90
Southeast	131,275,367	11,853,504	3,729,210	2,154,829	1,592,219	9.03%	2.84%	1.64%	2.34
West North Cen	51,738,369	19,443,693	574,001	411,436	413,392	37.58%	1.11%	0.80%	1.39
West South Cen	132,286,751	44,777,137	1,420,874	1,055,329	1,068,541	33.85%	1.07%	0.80%	1.33
West	86,506,882	45,398,427	576,739	490,477	832,534	52.48%	0.67%	0.57%	0.69
Total	690,392,946	153,577,121	15,647,066	9,690,197	7,262,820	22.24%	2.27%	1.40%	2.15

AUG

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

JL 29

OFFICE OF
POLICY, PLANNING AND EVALUATION

Mr. Denny Ellerman
Acting President
National Coal Association
1130 17th Street, N.W.
Washington, D.C. 20036-4677

Dear Mr. Ellerman:

I have enclosed an analysis, Sulfur Dioxide Emission Estimates for 1985, which was recently completed for us by ICF, Inc. In this report, ICF concludes that our 1985 estimate of coal-fired utility emissions is quite close to NCAs. We plan to replace our 1985 forecast with this new historical estimate.

While we are now in almost complete agreement about 1985 estimates, NCA and EPA still differ substantially on 1990 forecasts. I have directed my staff to work with you and ICF, Inc. in order to make sure that we both have all of the information we need in order to understand each others' assumptions and methodologies.

Sincerely,

Milton Russell

Milton Russell
Assistant Administrator
for Policy, Planning and Evaluation

Enclosure

Note: The report referred to in the above letter has been retained in committee files.

QUESTION FROM SENATOR STAFFORD
TO: CARL E. BAGGE

Mr. Bagge, your statement suggests that you believe that NCA's emissions estimates for 1980 through 1985 should be extrapolated through 1990, and perhaps even further, and that the result will be a decrease in emissions between 1980 and 1990 from power plants.

You point out that while EPA agrees with your figures from 1980 through 1985, there is disagreement with respect to future projections.

Indeed, EPA's estimates of emissions from utilities in 1990 is 4.8 million tons higher than the NCA projection. And various estimates of emissions in 1990 summarized by the office of Technology Assessment in the report, Acid Rain and Transported Pollutants, range from 2.8 to 5.2 million tons higher than the NCA estimates.

The ICF analysis that you attached to your written statement notes that factors that made EPA and NCA's estimates similar in the short term "are not expected to affect the emission forecasts in 1990 and later years significantly".

Another ICF report comparing NCA and EPA projections notes "Sometimes past trends may provide a reasonable forecast of the future, but in this case it is unlikely".

Is it your position that, notwithstanding the projections by several other organizations that predict significantly higher sulfur dioxide emissions in 1990, yours are the more reliable and realistic figures?

ANSWER:

First of all, most of the organizations still predicting significantly higher sulfur dioxide emissions in 1990 also predicted that sulfur dioxide emissions would be significantly higher in 1985 than they were in 1980. As we know now, those predictions were wrong. Normally, such error would lead to adjustment of out-year forecasts and reevaluation of the assumptions used in the erroneous forecast. With the exception of EPRI, this has yet to occur. For instance, EPA has adjusted the 1985 base case estimate for SO_2 emissions in 1985 to reflect what is now history, but has yet to alter the forecast for 1990 and beyond. If taken literally, this means EPA expects a greater increase in SO_2 emissions between 1985 and 1990 than they had earlier expected between 1980 and 1990. We maintain that this is an untenable position, and will not be surprised to see EPA's and others' forecasts of SO_2 emissions for 1990 and later years adjusted downward. Consequently, we do believe that our analysis, and the projections based on it, must be given equal, if not greater, credence than the work of other analysts in this field, especially with respect to 1990.

Secondly, those predicting higher emissions in 1990 have yet to comprehend and to reflect in their projections what happened between 1980 and 1985 and to appreciate what is likely to occur in the next four years. Between 1980 and 1985, coal use did not decline; it increased by 23%. Emissions of sulfur dioxide for powerplants did decline, by 3%, which means that the amount of SO_2 emitted per ton of coal consumed declined by 21%. As explained in our analysis submitted for the record, the largest single component in this was the reduction in the sulfur content of coal consumed by electric utilities. In ICF's analysis of the reasons for EPA's erroneous 1985 forecast, 1.1 of the 2.5 million ton difference, or 44%, is attributed to the use of lower sulfur coals. This was the chief error in the 1985 forecasts.

The salient fact about coal use between 1985 and 1990 is that it will not increase much, if at all. Thus, if there is to be an appreciable increase in SO_2 emissions from coal-fired powerplants, there must be a significant increase in the sulfur content of the coals consumed by electric utilities. No observer of coal markets sees such an increase or even any increase in average sulfur content. In fact, the expectation is that the decline observed from 1980 to 1985 will continue at least through 1990, although perhaps not in the same magnitude in the second five year period.

In earlier correspondence with EPA, ICF has elaborated a theory of coal markets by which sulfur premiums will widen significantly in the late 1980's, reflecting tighter low sulfur coal markets, which would cause electric utilities to switch to higher sulfur coals. Although always possible, we do not know of any other coal market observers who hold this view and we maintain that this interesting but maverick view cannot be the basis for reliable, realistic or responsible projections of SO_2 emissions from coal-fired powerplants.

WITNESS: CARL E. BAGGE, PRESIDENT
NATIONAL COAL ASSOCIATION

QUESTION FROM SENATOR GORDON J. HUMPHREY

1. A. number of low sulfur coal groups, such as the Alliance for Clean Energy and Rocky Mountain Energy, support acid rain control. Do you feel that your position as President of National Coal Association adequately represents low-sulfur coal interests?

ANSWER:

As stated in my testimony, the National Coal Association represents producers of both low and high sulfur coals. In fact, most coal companies in NCA's membership produce both lower and higher sulfur coals, in varying proportions depending on reserve positions and market opportunities. Although we have never made a detailed survey, we estimate that the sulfur content of NCA members' tonnage approximates the national distribution.

A number of NCA's members are members of the Alliance for Clean Energy, such as A.T. Massey Coal Company, Westmoreland Coal, Island Creek Coal Company, Ashland Coal Company, Utah International and Coastal Coal. A number of other NCA members are significant producers of low sulfur coal but not members of the Alliance for Clean Energy, such as Peabody Holding Company, the nation's largest low sulfur coal producer, Exxon Coal, ARCO Coal Company, Cyprus Minerals, Kerr McGee Coal Company, Pittsburg & Midway Coal Company, Mapco Coal, Drummond Coal Company, Jim Walter Resources, Shell Mining and others. All of these companies are prominent members of NCA and active participants in NCA policy formulation at both the Board and committee levels.

Although there is no requirement that individual companies conform to NCA's policy, all of these companies participate in the development and continued elaboration of NCA's policy with respect to acid rain, as presented to this committee and others.

The membership of the Alliance for Clean Energy does comprise, to the best of my understanding, producers of low sulfur coals. ACE does not support legislation which would "control" acid rain.

Rocky Mountain Energy is not a low sulfur coal group but a producer of low sulfur coal. Its parent, the Union Pacific Corporation, is also the owner of the Union Pacific Railroad which hauls western, low sulfur coals to midwestern coal markets. As stated before this committee, they do support acid rain control legislation.

TESTIMONY TO BE GIVEN BEFORE THE SENATE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

ON

PROPOSED LEGISLATION (S. 2203) RELATED TO ACID DEPOSITION CONTROL

September 25, 1986

Prepared by:

Edward H. Pechan
E.H. Pechan & Associates, Inc.
5537 Hempstead Way
Springfield, VA 22151
(703) 642-1120

I INTRODUCTION

My name is Edward Pechan. I am president of E.H. Pechan & Associates, Inc., a research and consulting firm with offices in Springfield, Virginia, and Durham, North Carolina. For the past five years, my firm has been conducting a variety of analyses related to the acid deposition issue for both public and private sector sponsors.

Today, I would like to discuss some of my firm's work on estimating coal resources and reserves. The availability of coals of specific types can have a significant impact on the methods industry uses to meet environmental standards, as well as on their costs and other economic effects. These issues are of concern to the alternative legislative proposals that are being considered to address acid deposition.

I would like to focus my remarks on three topics:

- The extent and location of coal resources that could meet an emission standard of 0.7 pounds of sulfur dioxide (SO_2) emitted per million British thermal units (Btu) of heat input as well as other numeric standards.
- The limitations of the information used to generate the results presented here.
- An outline of other issues that influence the use of coals of various types.

II EXTENT AND LOCATION OF COAL RESOURCES

The results from our analysis show that from approximately 110 to 170 billion tons of coal would meet a 0.7 pounds of SO_2 per million Btu annual standard out of a total resource base of from 460 to 750 billion tons. While we don't use much of this low-emissions coal now, we do use some. For example, in 1985, about 9 percent (or approximately 63 million tons) of the coal that was delivered to electric utilities could meet the 0.7 standard.

Let me provide some general background material and then explain how our results were generated. Coal is a common mineral found in a majority of states. Fewer states, however, have currently active mines. In 1985, 24 states produced coal that was shipped to electric utilities. Of these, Kentucky, West Virginia, and Wyoming were the only states that produced more than 10 percent of the total.

Coal resources and reserves can be categorized in a variety of ways. Generally, "resources" is a broader term that includes coals for which quantity may be poorly known or which may not currently be considered to have economic value due to factors such as great depth, small thickness of seam, or poor quality. The term "reserves" includes only those resources that can be fairly precisely characterized and that currently yield or can be anticipated to yield an economic benefit if recovered.

Sulfur is an important component of coals. Most United States coals have a sulfur content of from 0.3 to 6 percent. When burned in boilers such as those used in generating most electricity in the United States, such coals have the potential to emit from 0.4 to in excess of 10 pounds of sulfur dioxide (SO_2) per million British thermal units (Btu) of heating provided.

When burned in a boiler, from 75 to 97.5 percent of the sulfur present in coal is emitted to the atmosphere, unless otherwise controlled. The specific percentage emitted depends upon other coal characteristics; the 2.5 to 25 percent of the sulfur not emitted to the atmosphere bonds chemically with other components of the ash and is often termed the ash retention factor. These ash retention estimates are based on data from the U.S. Environmental Protection Agency (EPA). In addition, each pound of sulfur in coal, when combusted, is converted to 2 pounds of SO_2, since each of the two oxygen atoms contributed by the atmosphere weigh half as much as the sulfur atom contributed by the coal.

Even within a single deposit, the characteristics of coal that determine its potential to emit SO_2 vary considerably.

Knowledge of the region of origin, however, provides useful information as to likely characteristics.

Lower sulfur coals are often defined as those containing an amount of sulfur that, when burned, would emit 1.2 pounds or less of SO_2 per million Btu. Such coals are found in both the eastern and western parts of the United States, although the vast majority of eastern reserves meeting this criterion are found in Kentucky and West Virginia.

As the desired emission limit declines, there become fewer and fewer states that have significant reserves (or resources) available. Virtually no eastern coal will meet an emission limit below about 1 pound of SO_2 per million Btu.

As part of the data development work my firm has performed in support of the National Acid Precipitation Assessment Program, we have developed a data base that can be used to categorize coal resources in a variety of ways. This data base was primarily designed to support long-term policy studies.

In late April of this year, we were asked by EPA to use our data base to make a preliminary estimate of the quantities and locations of coal resources that could satisfy an annual average emission standard of 0.7 pounds of SO_2 per million Btu. The mathematical relationship between coal quality and atmospheric emission rate requires information on coal rank and coal heating value as well as sulfur content. Table 1 illustrates these relationships and reports the maximum sulfur content required for various illustrative coals to meet a 0.7 or 1.2 pound emissions standard. The figures in these examples are adjusted for the 2.5 to 25 percent ash retention discussed above.

Tables 2 and 3 summarize the results of the analyses we conducted in April. Table 2 reports the range of coal quantities that we estimated could meet a 0.7 and a 1.2 pounds SO_2 per million Btu standard. Table 3 reports these same estimates as percentages of each state's total coal resources recoverable under current economic conditions and using current mining technologies. The total quantities for the low case in Table 2 were estimated with the same assumptions used by the Department of Energy in developing the Demonstrated Reserve Base. These assumptions require a high degree of assurance that the resource is present in the quantities reported. The total quantities for the high case use a somewhat less restrictive resource assurance assumption with the same economic recoverability requirements.

Figures 1 and 2 identify states with major resources in the 0.7 and 1.2 categories while Figure 3 displays total quantities summed over the eastern and western states.

The estimates in Table 2 can be converted to a rough estimate of years of production available based on current total U.S. consumption by dividing by 1.5 since, using approximate recovery factors, current U.S. coal consumption depletes the nation's resource base by approximately 1.5 billion tons per year. Thus, for the nation as a whole, we have approximately 75 to 110 years worth of coal that would meet the 0.7 pounds of SO_2 per million Btu standard, assuming that it could all be utilized.

These data indicate that large quantities of coal exist that, when burned, would emit at 0.7 pounds of SO_2 per million Btu or less. Nevertheless, as further amplified in Section IV of this testimony, the mere existence of the resource does not guarantee that it can actually be extracted from the ground, transported to a demand area, and used.

The most important limitations on the information used in generating these figures are outlined briefly in Section III of this testimony. Despite these limitations, our findings are in general agreement with other data sources. For example, the Keystone Coal Manual, a standard reference for the coal industry, includes data that support our findings. For the Fort Union coal formation in Montana, data from the Keystone Coal Manual support an estimate of about 13.4 billion tons of coal that could meet a 0.7 pound standard, or approximately 30 percent of the total resources for which information was provided. This 30 percent figure, while less than our estimate of 54.7 percent reported in Table 3, is within the range of uncertainty for Montana due to the large quantities of coal that could be assigned to alternative SO_2 categories in our data base.

Major producers of the 63 million tons of coal delivered to utilities in 1985 which could meet the 0.7 standard were: Colorado, slightly over 5 million tons; Montana, approximately 7.5 million tons; Utah, 2.3 million tons; and Wyoming, 47 million tons. Note that these states are among those identified in Table 2 as having significant resources in this emissions category.

III LIMITATION OF AVAILABLE INFORMATION

It is important to recognize the limitations of the analysis we have done and the relative uncertainty of the data which support it. Many of the estimates of resources available were made prior to 1930. In many cases, more recent data have not been integrated into the data sources that were available to support our analysis. The extraction and coding of such information is a difficult task and was well beyond the scope of our original development work completed in 1983.

A more difficult issue is the matching of resource data (related to coal quantities) with analytic information (concerning coal quality). Most of the analytic data used in our analysis were obtained from samples of coal delivered to Federal facilities over a number of years. Our work as well as similar work done by the Department of Energy and others, assumes that the coal quality, as determined by these samples of coal mined and delivered for use, is representative of coal remaining in the ground to be mined. While this assumption may be entirely reasonable, its validity cannot be proven. Although our methodology sometimes results in assignment of large blocks of resources to single coal quality categories, if the exactness of the results becomes important, additional analysis can be done in an attempt to more finely characterize the quality of such large resource blocks. Such analyses would involve obtaining data directly from state agencies or other sources and, as a result, would take considerable time to complete.

The variation in coal quality within a seam is another issue we were not able to address. Currently, coal can be blended by the producer before delivery or by the user in order to meet required specifications. It is worth noting that blending becomes more challenging as the required specification is made stricter.

IV OTHER RELATED ISSUES

While the thrust of our work on this issue to date has been to provide initial quantitative estimates of in-the-ground coal resources that could meet a specific emissions standard, a number of other factors determine whether or not such coals are truly available in the market. These issues are complex and require considerable analysis to adequately consider. Since I have not examined these issues in detail, I cannot comment on their significance. Nevertheless, I think it is important to identify the relevant issues to support their possible future examination.

(1) Resource availability. For many reasons, resources may not be minable due to conflicting land use. For example, coal seams may be located in areas where mining is not feasible, such as national parks or under rivers and streams. Land ownership is also related to this concern, as is the position of local and state officials on mining development. Development decisions by Indian tribes will affect development of resources under their control.

(2) Recoverability. The resource quantities we and other researchers report generally do not account for the fact that not all of a resource can be recovered. Generally, recovery ranges from under 50 percent for some deep mines to over 90 percent for some surface mines. Recoverability is heavily influenced by local geographic conditions.

(3) Transportation. Coal must either be located near its point of use or be transported. Due to its bulk, water

and rail are the best modes for long distance transport. In some areas, limited transportation facilities are available.

(4) Usability. While new facilities can be designed to burn a particular coal, existing facilities may face constraints or economic penalties on the use of fuels dissimilar from those for which they were designed.

V CONCLUSIONS

Our analysis shows that substantial quantities of very low sulfur coal exist in the United States. Based on comparisons with other work, we believe that our conclusions in this regard are defendable. Although the particular figures we have provided to date are initial estimates, we believe more focused study to refine them will be unlikely to alter the basic findings.

Table 1
Relationship between Emission Rate and Coal Sulfur for Illustrative Coals

Coal Rank	Coal Heating Value (Btu/lb)	Maximum Sulfur Content (%)
Desired Emission Rate:	**1.2 pounds of SO_2/MMBtu**	
Bituminous	11,500	0.71
Subbituminous	9,000	0.62
Lignite	7,000	0.56
Desired Emission Rate:	**0.7 pounds of SO_2/MMBtu**	
Bituminous	11,500	0.41
Subbituminous	9,000	0.36
Lignite	7,000	0.33

Table 2

Range of Coal Quantities which Could Meet a Specified Standard

(Billions of Tons)

	would meet 0.7 lbs SO2/MMBtu	would meet 1.2 lbs SO2/MMBtu	total coal in state
Eastern States			
Alabama	<.1 - <.1	1.3 - 2.2	5.0 - 9.2
Arkansas	<.1 - <.1	<.1 - <.1	0.4 - 1.1
Illinois	<.1 - <.1	<.1 - <.1	67.6 - 147.9
Indiana	<.1 - <.1	0.2 - 0.7	10.6 - 31.4
Kentucky	<.1 - <.1	10.3 - 14.1	34.0 - 44.3
Maryland	<.1 - <.1	<.1 - <.1	0.8 - 1.0
Ohio	<.1 - <.1	<.1 - <.1	19.1 - 23.8
Pennsylvania	<.1 - <.1	0.6 - 1.9	30.3 - 66.6
Tennessee	<.1 - <.1	0.2 - 0.4	1.0 - 2.0
Virginia	0.3 - 0.4	2.2 - 3.0	3.5 - 5.2
West Virginia	0.4 - 0.8	18.1 - 41.0	39.8 - 82.7
Subtotal - East	0.7 - 1.2	32.8 - 63.3	212.0 - 415.2
Western States			
Colorado	4.8 - 7.0	10.7 - 18.8	17.3 - 26.6
Iowa	<.1 - <.1	<.1 - <.1	2.2 - 5.0
Kansas	<.1 - <.1	<.1 - <.1	1.0 - 2.8
Missouri	<.1 - <.1	<.1 - <.1	6.1 - 10.0
Montana	78.6 - 93.2	117.0 - 140.9	120.4 - 143.5
New Mexico	<.1 - <.1	1.8 - 2.2	4.5 - 5.9
North Dakota	0.6 - 0.6	0.7 - 2.7	10.0 - 10.0
Oklahoma	<.1 - <.1	0.8 - 1.1	1.6 - 2.5
Texas	<.1 - <.1	<.1 - <.1	12.7 - 12.7
Utah	0.4 - 0.5	5.1 - 7.4	6.5 - 9.4
Washington	0.8 - 1.0	0.8 - 1.0	1.5 - 2.3
Wyoming	27.2 - 64.2	37.7 - 86.1	69.9 - 111.0
Subtotal - West	112.4 - 166.5	174.6 - 260.1	253.6 - 341.6
Total	113.0 - 167.7	207.4 - 323.4	465.6 - 756.8

Notes: This table includes only states in the contiguous U.S. with resources of more than 1 billion tons.

The low estimate uses the "Demonstrated Reserve Base" (DRB) definition of reserves and assumes that 100 percent of the sulfur in coal is emitted to the atmosphere.

The high estimate adds inferred resources economically recoverable under current conditions and uses EPA estimates of the fraction of coal sulfur emitted to the atmosphere.

Table 3

Range of Coal Quantities which Could Meet a Specified Standard

(Percentage of Total Estimated Resources)

	would meet 0.7 lbs SO2/MMBtu	would meet 1.2 lbs SO2/MMBtu
Eastern States		
Alabama	<.1 - <.1	14.1 - 24.5
Arkansas	<.1 - <.1	<.1 - <.1
Illinois	<.1 - <.1	<.1 - <.1
Indiana	<.1 - <.1	0.7 - 2.1
Kentucky	<.1 - <.1	23.2 - 31.9
Maryland	<.1 - <.1	<.1 - <.1
Ohio	<.1 - <.1	<.1 - <.1
Pennsylvania	<.1 - <.1	0.9 - 2.9
Tennessee	<.1 - <.1	9.0 - 18.1
Virginia	5.8 - 7.4	41.8 - 57.7
West Virginia	0.4 - 0.9	21.9 - 49.5
Subtotal - East	0.2 - 0.3	9.9 - 19.0
Western States		
Colorado	18.2 - 26.3	40.2 - 70.8
Iowa	<.1 - <.1	<.1 - <.1
Kansas	<.1 - <.1	<.1 - <.1
Missouri	<.1 - <.1	<.1 - <.1
Montana	54.7 - 65.0	81.5 - 98.1
New Mexico	<.1 - <.1	30.1 - 36.4
North Dakota	5.7 - 5.7	7.3 - 27.0
Oklahoma	<.1 - <.1	30.7 - 43.4
Texas	<.1 - <.1	<.1 - <.1
Utah	4.2 - 5.4	54.5 - 79.1
Washington	34.6 - 43.8	35.3 - 45.9
Wyoming	24.5 - 57.8	34.0 - 77.5
Subtotal - West	32.9 - 48.8	51.1 - 76.2
Total	16.8 - 24.9	30.8 - 48.0

Notes: This table includes only states in the contiguous U.S. with resources of more than 1 billion tons.

The low estimate uses the "Demonstrated Reserve Base" (DRB) definition of reserves and assumes that 100 percent of the sulfur in coal is emitted to the atmosphere.

The high estimate adds inferred resources economically recoverable under current conditions and uses EPA estimates of the fraction of coal sulfur emitted to the atmosphere.

Figure 1

States Having Coal Available to Meet 0.7 Pounds SO2/Million Btu Standard

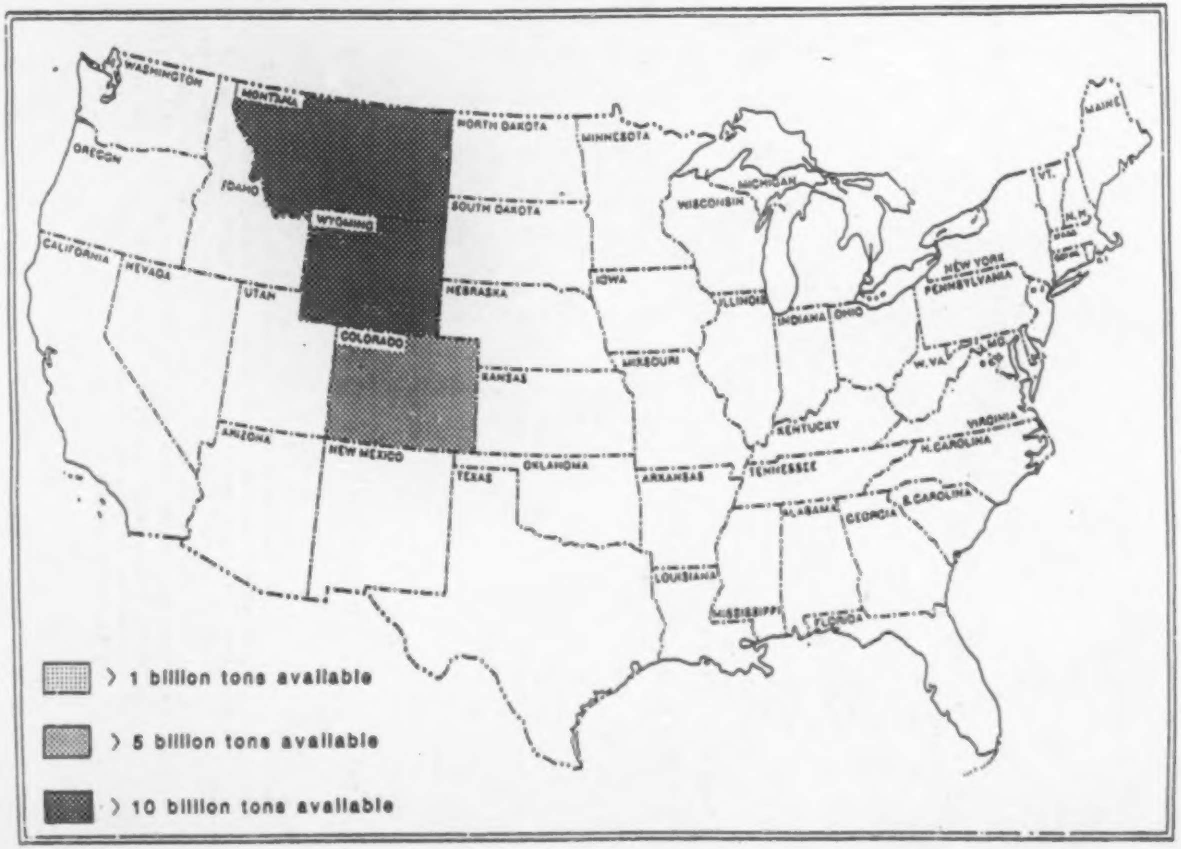

WASHINGTON
OREGON
CALIFORNIA
NEVADA
IDAHO
MONTANA
WYOMING
UTAH
ARIZONA
COLORADO
NEW MEXICO
NORTH DAKOTA
SOUTH DAKOTA
NEBRASKA
KANSAS
OKLAHOMA
TEXAS
MINNESOTA
IOWA
MISSOURI
ARKANSAS
LOUISIANA
WISCONSIN
MICHIGAN
ILLINOIS
INDIANA
OHIO
KENTUCKY
TENNESSEE
MISSISSIPPI
ALABAMA
GEORGIA
FLORIDA
S.CAROLINA
N.CAROLINA
VIRGINIA
W.VA.
MD.
NEW YORK
PENNSYLVANIA
VT.
N.H.
MAINE
▦ > 1 billion tons available
▦ > 5 billion tons available
▦ > 10 billion tons available

Figure 2

States Having Coal Available to Meet 1.2 Pounds SO2/Million Btu Standard

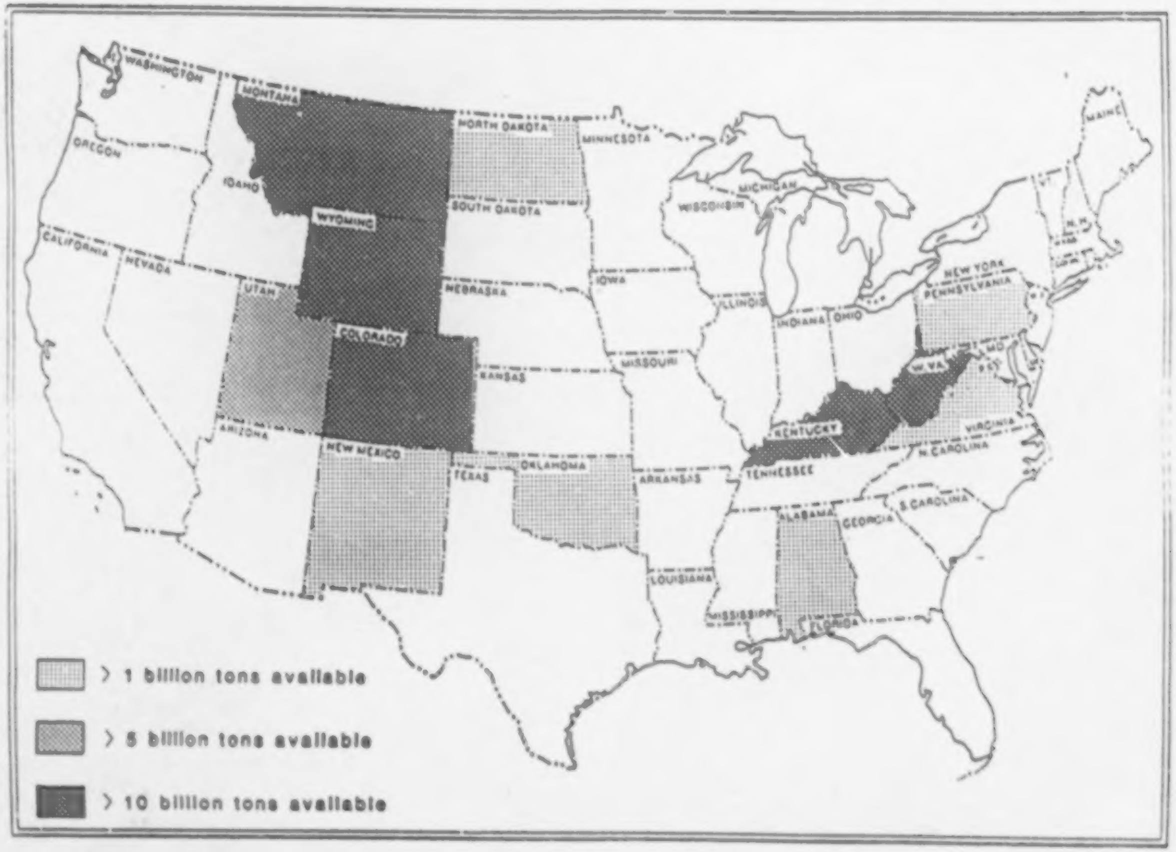
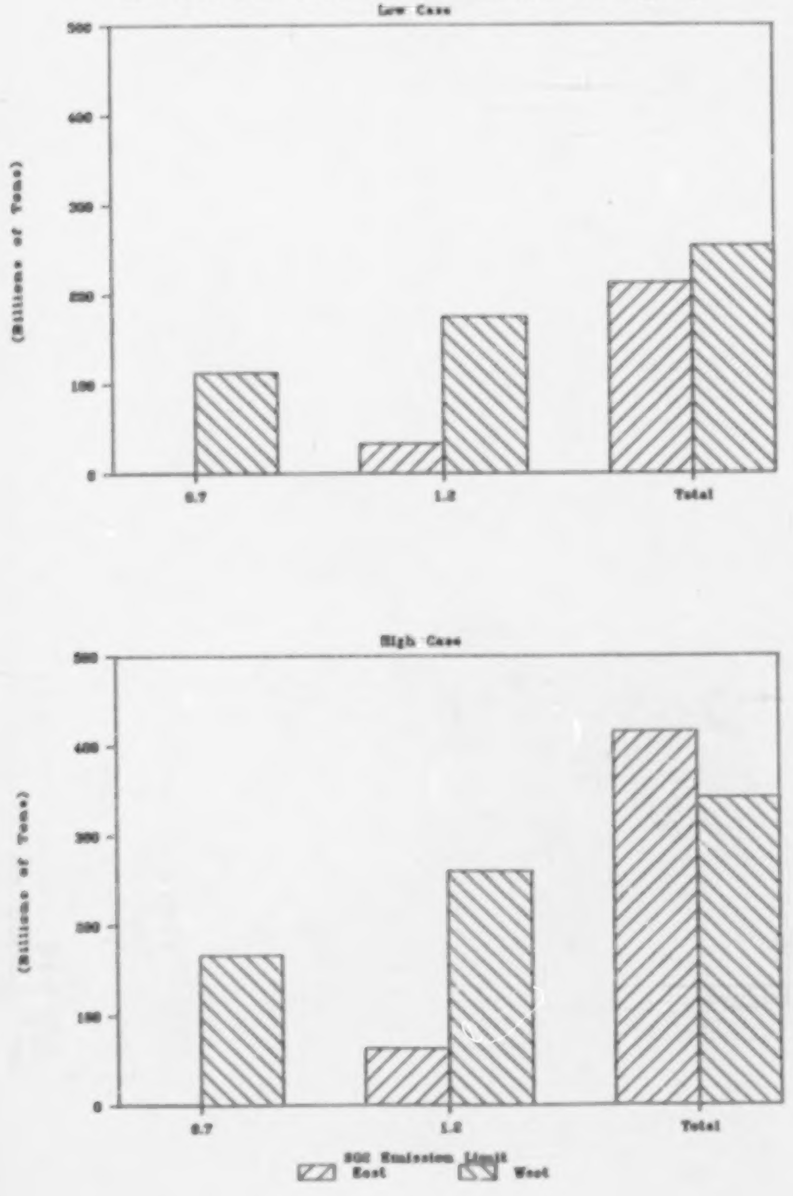

WASHINGTON
OREGON
CALIFORNIA
NEVADA
IDAHO
MONTANA
WYOMING
UTAH
ARIZONA
COLORADO
NEW MEXICO
NORTH DAKOTA
SOUTH DAKOTA
NEBRASKA
KANSAS
OKLAHOMA
TEXAS
MINNESOTA
IOWA
MISSOURI
ARKANSAS
LOUISIANA
WISCONSIN
MICHIGAN
ILLINOIS
INDIANA
OHIO
KENTUCKY
TENNESSEE
MISSISSIPPI
ALABAMA
GEORGIA
FLORIDA
S.CAROLINA
N.CAROLINA
VIRGINIA
W.VA.
MD
DEL
PENNSYLVANIA
NEW YORK
VT.
N.H.
MAINE
MASS
CONN
> 1 billion tons available
> 5 billion tons available
> 10 billion tons available

Figure 3

Coal Resources by Emission Category



Senate Committee on Environment and Public Works
Hearings on S. 2203 and Other Acid Rain Legislation
September 25, 1986

Questions from Senator Simpson for Edward H. Pechan and responses

Question

1. How much coal was actually mined in 1985 which would meet the 0.7 lbs. SO_2/MM BTU standard in S. 2203? Where was that coal mined?

Response

The best data on coal qualities are supplied by electric utilities which must provide information to the Federal Energy Regulatory Commission on the quality of fuels received. Based on a shipment-by-shipment analysis of this data, in 1985, utilities received 63 million tons of coal which could meet an annual 0.7 pound standard. While this data is for as-received quality as opposed to run-of-mine, we feel that coals of this type are unlikely to have been subjected to washing designed to achieve sulfur reduction. The sources and quantities from states providing 1 million tons of more were:

Origin State	Quantity (million tons)
Colorado	5.1
Montana	7.6
Utah	4.7
Wyoming	47.3

Question

2. In analyzing S. 2203 and projecting coal resource availability, did you assume that the 0.7 lb. standard would be applied on an annual or monthly average, or as stated in the bill, a strict 0.7 lbs. without averaging?

Response

Our analysis was based on application of the 0.7 as an annual average. Our response to question 3 discusses some of the implications of alternative standards on the results.

Question

3. Where and what quantity of coal mined today would meet a strict, non-averaged, 0.7 lbs. SO_2/MM BTU? Would your estimates be any different without averaging?

Response

Calculation of annual equivalents of alternative averaging times requires making a number of assumptions and some complex calculations. The following table presents a range of equivalent annual averages to several shorter averaging times specified with a 0.7 pounds of SO_2 per million Btu numeric limit. The ranges presented here do not, however, account for all sources of variations and, as a result, should be used with caution.

Averaging Time	Annual Average Equivalent (lbs SO_2/MMBtu)
Annual	.7
30 days	.61 - .66
7 days	.54 - .61
1 day	.49 - .56
1 hour	.36 - .47

The quantity of coal delivered to utilities in 1985 that could meet various standards is as follows:

Standard (lbs SO_2/MMBtu)	Quantity (million tons)
0.7	62.9
0.6	20.1
0.5	8.1

These data has been analyzed on a shipment-by-shipment basis. As a result, these figures cannot be used to determine whether or not the mines from which these shipments came from can produce coals of these qualities on a consistent basis.

Senate Committee on Environment and Public Works
Hearing on S. 2203 and Other Acid Rain Legislation
September 25, 1986

Questions from Senator Gordon J. Humphrey
for Edward H. Pechan and responses

Question

1. How reliable are your numbers and does this data compare with data on coal reserves collected in the past?

Response

The total numbers from our analysis (undifferentiated as to sulfur content) are in good agreement with the Demonstrated Reserve Base published by the Department of Energy (DOE). This is not surprising since our work utilized much of the same raw data. DOE no longer publishes this data categorized by quality type. We have made some limited comparisons of our quality estimates with data from other sources and feel that our conclusions are in reasonable agreement. The ash retention factor which we included in our calculations is an important component in estimating emissions from subbituminous and lignite coals.

Question

2. Can you show that the western reserves are economically recoverable?

Response

All of the figures in our analysis used the same economic recoverability criteria used by DOE in its Demonstrated Reserve Base studies. The general criteria define economic recoverability based on seam thickness (minimum of 28 inches for deep reserves and 5 feet for surface reserves), depth (1000 feet maximum for deep reserves), and overburden ratio (no more than 5 to 1 for surface reserves). These assumptions are all based on current technology and, in our analysis, result in the exclusion of approximately 50 percent of total identified coal resources from the figures which we presented.

Question

3. It has been quoted that only 4 out of over 4,000 western low sulfur mines produced coal,clean enough to meet the .7 standard set in S.2203. Given the time

needed to attain a Federal lease and to open a mine, how soon could the low sulfur coal which is contained in these Western reserves be available for use?

Response

I have not seen the study which is the source of the 4 mines figure and, as a result, I cannot comment on it. I have not done an analysis to attempt to quantify the time required to develop additional low sulfur resources. Some of these resources, however, are located relatively close to existing mines and transportation facilities. Estimation of time to meet administrative and procedural requirements is particularly difficult.

Question

4. Due to transportation costs and other considerations, would low sulfur coal from western reserves be competitive in mid-western or eastern markets?

Response

In 1985, coals from Montana and Wyoming, two states with high low sulfur coal resources, were being shipped in quantity to utilities in states as far east as Indiana and Michigan. These coals have the potential to penetrate further east to Ohio and possibly Pennsylvania, particularly along waterways where a number of major plants are located.

Factors which influence market penetration of alternative coals include current mine mouth costs, current transportation costs, trends in production and transportation costs, and compatibility with combustion equipment. We have not analyzed these factors in detail with regard to current legislation.

Testimony of Richard E. Ayres
Chairman, National Clean Coalition
in Support of S. 2203, The New Clean Air Act
Committee on Environment and Public Works
U. S. Senate, Washington, D.C.
Thursday, September 25, 1986

Mr. Chairman, these hearings come at the end of the current session of Congress, but that makes them no less urgent. It is time to renew, revise and strengthen the Clean Air Act. Public health and the public welfare demand it.

For the past six years, we have seen a stalemate in Congress while the Environmental Protection Agency has raised inaction to an art form.

Sulfate pollution shortens tens of thousands of lives and acid rain destroys human, natural and economic resources as EPA catalogues new sulfur dioxide control options and one by one rejects them.

Tens of millions of Americans continue to breathe unhealthful levels of ozone. Yet EPA's so called control strategy threatens to impose new pollution control requirements only as a last resort.

Health standards remain unchanged as EPA ignores, reanalyzes or wrings its hands over new evidence of health damage from air pollution.

Pollution control for trucks and buses is put off until the 1990's.

Toxic air pollutants spew unregulated from sources large and small despite the dangers and the obvious cures.

The symptoms of air pollution are all around us: acid rain; dead and dying lakes and forests; disappearing natural resources; shortened lives and pain for the chronically ill and the very young; the government's own evidence of global warming and disruptions in the stratosphere.

With EPA dead in the water, the victims of air pollution have turned to Congress for leadership. S. 2203 is an excellent example of how that leadership can be applied. Yet everyone else at this table this morning will oppose S. 2203. Everyone will say the symptoms are illusory; or that the evidence is uncertain; or that the cause is unclear; or that another industry is the cause; or that the status quo is acceptable; or that the costs are too great.

Everyone, in short, will ask you to do nothing. I believe, Mr. Chairman, that the cost of doing nothing is the unacceptable cost--as our natural resources and our protective atmosphere deteriorate under the insult of tens of millions of tons of pollution year after year. The unacceptable cost is the cost of an asthmatic child's pain, of a life shortened by air pollution.

We should be debating today not whether S. 2203 is too ambitious, but whether it is too moderate. S. 2203 will suffer many indignities today. But it sets pollution standards at levels already being met or exceeded in practice, in today's economy, with today's supplies of coal, by today's motor vehicles.

There is nothing immoderate, to me, in asking American industry to show its can-do spirit, and do the best it can do--not the least it is required to do--in controlling air pollutants that are causing demonstrable human and natural damage with every day we delay.

The refreshing thing about S. 2203, Mr. Chairman, is its approach. S. 2203 renews the promise of the Clean Air Act and reaffirms its intent. It is clear, direct and simple. Tax simplification is in vogue today, but what you have proposed is a "short form" of air pollution control. Like the auto emission standards adopted in 1970, S. 2203 will work.

This bill says all power plants must eventually meet a responsible standard of pollution control--not some plants, but all plants. And it sets a reasonable deadline in the next century for finishing the job. This bill says that all industrial boilers must eventually meet a responsible standard of pollution control. That all trucks, buses and diesel engines must eventually meet such a standard. And in the case of passenger cars, it says just what the Clean Air Act has always said--that all cars should strive to keep up with the leaders in pollution control, that we should regulate on the basis of the best performers. It is not immoderate to ask American industry to do the best it can do.

Indeed, history tells us that whenever we have set an ambitious standard, and held firm to it, American ingenuity has found a way to meet the standard at reasonable cost in a reasonable time frame.

The greatest success story of the Clean Air Act to date has been reducing pollution from automobiles. I believe progress was achieved because Congress set an ambitious standard and held the auto industry to it. The result has been extraordinary.

In the case of sulfur dioxide pollution from power plants, Congress set less ambitious requirements. The result has been that instead of being cleaned up, enormous power plants (many built after the 1970 Act was passed) conmtinue to operate with no sulfur oxide pollution controls at all, but with taller and taller smokestacks designed to export pollution far from the site and thus avoid local challenge.

Ironically, the result has been that as our cars got cleaner in the 1970's, our power plants were getting bigger staying environmentally dirty. And the development of new technologies has lagged in the U.S. while Japan has been proving the technologies and readying them for the U.S. market.

Yet the leaders of the utility industry will ask you to do nothing. They will say the case is unclear, the evidence uncertain, the control challenge too big, the costs too great. I wish just one would come forward today and say, "This is what we can do. This is the way to do it at least cost. This is when we can finish the job."

But none of them will. The utility industry analysis of the House bill H.R. 4567 actually assumed that the utility managers would not take advantage of the bill's cost saving provisions. In other words, the industry cost estimate actually assumed incompetent utility management.

The industry will offer similar arguments today. The Edison Electric Institute is circulating a new brochure on acid rain, Mr. Chairman, that I would like to share with you this morning. What causes acid rain? The casual reader of this document might get the impression that volcanoes, geysers, lightning storms, sea spray, bacterial activity and decaying vegetation are among the sources of most concern while the utility industry's contribution, thank goodness, is declining.

Mr. Chairman, I want to say a few words about another bill, S. 2813, sponsored by Senator Proxmire and others. S. 2813 is presented as a regional response to controlling acid rain pollutants. The bill makes no attempt to address the broader problem of air pollution control, and thus falls short of the mark. But the bill is inadequate even as a response to acid rain.

In the first place, acid rain is a national problem that demands a national solution. S. 2813 would limit the control program to the 31 eastern states, an approach considered but not adopted in past years. Mounting evidence of the nature and extent of the threat of acid rain in the West has rendered the regional approach inadequate. Certainly, acid rain damage is less widespread in the West so far, and we should take advantage of the chance we have in the West to avoid the natural devastation found in the East. This bill would ask us to step backward, and do nothing until the problem gets worse.

The bill also ignores the contribution of mobile sources to acid rain, an oversight that will have its greatest negative consequences in the West.

This legislation is shortsighted in other ways, as well. In the first place, in its planning provisions it invites bureaucratic delay at the state and national level. And by enshrining a "two-step" control and study process, the bill invites affected industries to lobby EPA and then the Congress over the next six years rather than concentrating on pollution control. The temptation might be overwhelming for affected industries to shortcut the first phase, using temporary measures or easily rversed control options like fuel switching, while lobbying to the last for relief from the second phase.

In this context, some have seen the regional approach as offering the best of both worlds for the West--no local cleanup requirements with new markets for Western low sulfur coal. I believe if this bill were enacted, it would create a boom-bust cycle in western mines, as many power plants switched to low sulfur fuel for the first phase, and switched five to seven years later to the more cost effective (for them) option of local coal and technology once Congress reaffirms (or more likely, increases) the pollution control requirements in the bill.

Mr. Chairman, six years of inaction have created a long agenda of urgent air pollution problems. By proposing S. 2203, you have reaffirmed that Congress can lead in developing solutions to these problems, even if EPA will not.

The progress achieved so far in cleaning up our nation's air has come primarily from Congressionally imposed deadlines and control requirements. A similar approach is required if we are to continue to make progress.

Deadlines provide means for citizens to hold their government accountable. And EPA has shown a willingness to move at least a little faster when the Congressional intent is crystal clear and the deadlines are certain and short-term.

Congress must make attainment of healthful air quality for the auto-related pollutants an urgent priority. Congress must respond to acid rain and the threat to our atmosphere.

Congress must also put an end to EPA's inaction on toxic air pollutants. For years, EPA has promised to regulate the dozens of known and suspected carcinogens emitted routinely into the air. Every promise, including that of Administrator Ruckelshaus in 1983, has been broken. The current system allows industrial plants to avoid pollution control costs by shifting the burden to the public down wind, based on crystal ball health effects assumptions entered in EPA computers. Meanwhile, EPA marches in ever smaller circles in search of the perfect balance between excess human deaths and estimated control costs.

In S. 2203, the Committee has proposed an important first step toward revitalizing our nation's slumbering air pollution cleanup program. I urge you to move quickly on this bill and to continue this welcome trend when you return in January.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

March 3, 1986

OFFICE OF
POLICY, PLANNING AND EVALUATION

Carl Bagge
National Coal Association
1130 17th Street NW
Washington, D.C.

Dear Mr. Bagge:

Thank you for giving our staff the opportunity to review the National Coal Association's projections of SO_2 emissions from coal-fired powerplants. In response to your presentation, we have conducted a thorough comparison of our forecasts with those of the NCA. In the course of our review, I believe that both of us have learned a great deal about our respective methodologies and viewpoints. I hope that such staff level contacts, which facilitate understanding between your organization and our Agency, will continue in the future. I really appreciate the professionalism and responsibility with which you and your organization have approached this issue.

Your 1984 data were particularly helpful to our ongoing efforts to refine our near-term emissions estimates. We agree with you that our 1985 estimate now appears to be too high. We plan to revise our 1985 estimate once we get the data for that year.

In developing our Base Case, EPA explicitly recognized the existence of alternative views of the future of SO_2 emissions. The case which you so thoroughly reviewed was only our best estimate; we also developed a high emissions case and a low emissions case to accommodate other viewpoints. While what we know now might change some of the best estimate assumptions we made in 1984, we are also of the view that our best estimate 1990 forecast is still reasonable--within the range of error that such estimates necessarily have. We are also of the opinion that the NCA 1990 forecast, which falls well below even our low emissions case, cannot be reconciled with our view of probable futures.

I feel that it is important to emphasize that our Base Case forecasts are developed out to 2010. The 1985, 1990, 1995, 2000 and 2010 estimates illustrate the general direction in which we believe emissions will change. For most of our policy analyses, we are mainly interested in trends beyond 1990. As you can see in Figure 1, our best prediction is that SO_2 emissions from coal-fired powerplants are increasing, slowly but steadily. We predict that SO_2 emissions will increase by 1.9 million tons between 1980 and 1990 and another 4.4 million tons between 1990 and 2010. In our high emissions case, emissions increase by about 2.5 million tons between 1980 and 1990 (or 0.6 million tons more than in the base case). Further, the 2010 emissions are 6.2 million tons higher than the base case. In our low emissions case, emissions increase by about 1.6 million tons between 1980 and 1990 and by 2010, emissions are lower than 1980 levels. However, in none of our cases do emissions decline by the year 1990.

I want to emphasize that we are in almost complete agreement with you as to the historical estimates of 1980 and 1984 emissions. We also agree with you, for the most part, as to why emissions were lower in 1984 than they were in 1980.

The difference between the EPA and the NCA 1990 forecast is really quite simple. The NCA implicitly assumes that the factors which caused emissions to be lower in 1984 than they were in 1980 will continue in the latter half of the decade. EPA does not.

In this letter, I will provide a general discussion of the sources of the differences between the EPA and the NCA estimates. I have also attached a detailed analysis of the near-term coal-fired powerplant emission trends performed for us by ICF, Inc. I am particularly glad that your comments prompted us to conduct this review because this careful explanation of our near-term forecasts will be helpful to many other people as well.

HISTORICAL EMISSIONS: 1980-1984

We agree almost completely with the NCA's 1980 and 1984 emissions estimates. Based upon a preliminary assessment of available 1984 data, we would estimate slightly higher emissions than NCA by (1) using recently revised assumptions about sulfur retention in ash, (2) including plants smaller than 50 MW and (3) using plant-specific rather than generic estimates of scrubber efficiencies and (4) accounting for different utilization at scrubbed vs. unscrubbed units at the same plant.

We agree with the NCA that emissions in 1984 were slightly lower than they were in 1980. However, we feel that it is misleading to draw a straight line between 1980 and 1984. As you can see in Figure 2, what happened in the first half of the decade was that emissions bottomed out during the 1982 recession and then began to rise again in 1983 and 1984. Thus, the NCA extrapolation is not exactly a continuation of a decline between 1980 and 1984, but a turnaround from 1983-84 increases.

REASONS FOR THE 1980-84 TREND

EPA agrees with NCA that the 15% decline in average emission rates at coal-fired powerplants (from 2.64 to 2.26 pounds per million Btu) caused SO_2 emissions to be 2% lower in 1984 than they were in 1980 despite a 17% increase in coal demand.

EPA also agrees with NCA that four factors drove the decline in emission rates:

(1) The NSPS effect: the addition of new coal-fired capacity subject to stringent New Source Performance Standards;

(2) Demand shift: relatively higher coal demand growth in the low-sulfur-coal burning west than in the high-sulfur coal burning east;

(3) Fuel shift: switching from higher to lower sulfur fuels at existing plants driven by SIP compliance and an unusually soft low sulfur coal market;

(4) Scrubber effect: the addition of retrofit scrubbers to existing plants to comply with SIP limits.

1990 FORECASTS

Most of the 4.8 million ton difference between the NCA and EPA 1990 SO_2 emission estimates can be explained by the fact that EPA's number is a "forecast", whereas NCA's number is an "extrapolation". We are in fairly close agreement with NCA as to the reasons why 1984 emissions were somewhat lower than 1980 emissions. However, the NCA assumes that emission rates will continue to decline at the same rate from 1984-1990 as occurred in the 1980-84 period. Thus, the extrapolation implicitly assumes that the conditions driving the 1980-84 difference will continue for the rest of the decade. EPA believes that these conditions will change, as described below.

EPA forecasts that fewer new coal-fired capacity additions will come on line in the next five years than was the case in the last five years (19 GW from 1985-90 vs. 35 GW from 1980-84). Thus we expect the "NSPS effect" to be reduced.

EPA also expects the "demand shift" to be reduced considerably; i.e. that the differential between eastern and western coal consumption growth rates will narrow. NCA expects the demand shift to continue. This difference of opinion is explained below.

Much of the 1980-84 decline or declining growth in coal consumption in many of the higher emitting industrial eastern states (e.g., Ohio, Pennsylvania, Michigan, and Kentucky) was due to the 1981-82 recession, slow recovery and the addition of nuclear plants. There was also high growth in coal consumption in many of the lower emitting western states, where overall electricity demand was less affected by the recession. Much of this demand shift was actually an "NSPS effect", as most of this growth in the west was at new coal-fired powerplants meeting NSPS.

For the latter half of the decade, NCA and EPA project different national levels and regional patterns of coal consumption. We expect improved electricity sales growth as the economy recovers, particularly in some of the high sulfur emitting eastern states (2.3% per year between 1984 and 1990 vs. only 1.3% per year between 1980 and 1984.) Partly as a consequence of higher sales of electricity, EPA predicts that national coal consumption will be higher than NCA does. In 1990 EPA forecasts that 784 million tons of coal will be consumed by the utility sector; the NCA anticipates that only 726 million tons will be consumed.

A good way to highlight the difference between the NCA and EPA regional coal utilization patterns through 1990 is to consider the Midwest (the "ENC" NERC Region)[1]. 233 million tons of coal were consumed in the Midwest's utility sector in 1980, roughly 33% of all coal consumed in the U.S. Most of this coal has high sulfur content. EPA predicts that coal consumption in Midwestern powerplants will grow at 2.7% per year through 1990. Alternatively, the NCA predicts that coal consumption will actually decline in this sector of the economy. The NCA forecasts a -0.4 annual coal consumption growth rate through 1990. These Midwestern growth numbers are so different because of the underlying assumptions about overall electricity growth rates. These growth rates are a complex function of assumptions about population and industrial growth and the electricity intensity the economy. The differences in projected coal utilization patterns in this region and their implications for the "demand shift" account for a significant portion of the difference in SO_2 emissions estimates through 1990.

1- The NCA defines the Midwest region based upon National Reliability Council (NERC) breakdowns to include the states of Michigan, Wisconsin, Illinois, Indiana, Ohio, West Virginia, Kentucky, the eastern portion of Missouri and small portions of Virginia, Pennslyvania and Maryland. ICF delineates coal consumption patterns by state and not by NERC region. To make a comparison of growth rates for the Midwest region, coal consumption for the states of Michigan, Wisconsin, Illinois, Indiana, Ohio, Kentucky and West Virginia are aggregated.

The significant decline in emission rates from "fuel shifts" at existing plants between 1980 and 1984 was caused, for the most part, by compliance with SIPs delayed since the 1970s. Also, a number of powerplants shifted to lower sulfur coals not required by their current SIPs. This happened because of regulatory uncertainty at the time at which the contracts were signed and/or unusually soft market conditions for lower sulfur coals.

We expect the "fuel shift" --as well as the retrofit "scrubber effect"--to be much less important in the near future than it was in the recent past. We expect only half as many emission reductions from new compliance as occurred in the first half of the decade. The Base Case does include some small amount of emission reductions (approximately 100,000 tons) that are expected to occur in Wisconsin and New York as a result of their new state acid rain regulations. This effect is minor compared to the compliance effect in the early 1980s.

Also, powerplants which contracted for lower sulfur coals due to soft short-term market conditions or, in a few cases, because of uncertain SIPs (which have since been approved at higher sulfur levels) would be expected to shift to higher sulfur coals as these contracts expire. Finally, powerplants consuming low sulfur coals well below the sulfur requirements are expected to shift to higher sulfur coals as coal markets firm. We expect eastern coal markets to firm as excess coal mining capacity is reduced by a combination of increased coal demand and mine retirements. We expect the low sulfur coal market to firm earlier than the high sulfur coal market because of higher new demand for low sulfur coal at new plants. The sulfur premiums thus created will encourage economically rational plants to choose higher sulfur coals to the extent that it is permitted. Thus, EPA sees very little in the way of regulatory or market forces that would cause as significant a decline in emission rates as was experienced between 1980 and 1984.

Once the Stack Height SIPs are submitted and we have a better idea of the effectiveness of our Stack Height Rule, we will account for those reductions in our Base Case. However, even if we were to use our estimate of the maximum achieveable emission reduction from the Stack Height Rule--1.7 million tons--we would still not show a decline in emissions by 1990. Further, we anticipate that the emissions reductions from the Stack Height Rule will be lower--perhaps considerably--than the maximum of 1.7 million tons suggested earlier.

ICF performed some calculations to approximate the relative significance of these differences in the NCA's and EPA's 1990 estimate. The analysis is described on pp. 29-33 in the attached ICF report and the calculations are documented in Appendix D. About 1.2 million tons of the 4.8

million ton diffference is associated with different national and regional coal demand. Another 1.2 million tons is associated with the NCA's assumption that coal markets will not firm in any way by 1990; i.e., that there will be no sulfur premiums. NCA's assumption implies that emission rates at existing plants will not increase nor will the utilization of existing high sulfur relative to existing low sulfur plants change. Half of the difference (i.e., the remaining 2.4 million tons) is associated with the assumption that, in addition to SIP compliance and state acid rain legislation already assumed by EPA, there will be further reductions in the average emission rates of existing coal plants.

CONCLUSION

I hope this letter and the attached ICF analysis suffice as an explanation of the difference between the EPA and NCA 1990 forecasts. If your staff has further questions, Judi Greenwald, the project officer for the Base Case development, would be the appropriate contact. We plan to share with you any future refinements we make on our Base Case and would be more than willing to review any of your adjustments.

Thank you again for your comments, and for your cooperation during our review. I look forward to continued productive exchanges on environmental analyses in the future.

Sincerely,

Milton Russell

Milton Russell
Assistant Administrator for Policy,
Planning & Evaluation

The following questions were submitted to Mr. Richard Ayres by Senator Gordon J. Humphrey. As of November 14, no response had been received.

WITNESS: RICHARD E. AYRES
QUESTION FROM SENATOR GORDON J. HUMPHREY

1. DOES THE NATIONAL CLEAN AIR COALITION SUPPORT THE HOUSE ACID RAIN BILL, H.R. 4567?

2. HOW WOULD YOU COMPARE S. 2813 TO H.R. 4567?

3. IN YOUR TESTIMONY YOU STATE THAT S. 2813 "IGNORES THE CONTRIBUTION OF MOBILE SOURCES TO ACID RAIN." HOW DO YOU EXPLAIN THIS COMMENT? DO YOU BELIEVE THAT THE NITROGEN OXIDE EMISSION STANDARDS FOR CARS AND TRUCKS WHICH ARE CONTAINED IN S. 2813 WILL HAVE NO EFFECT?

4. YOU FURTHER STATE THAT S. 2203 "SETS POLLUTION STANDARDS AT LEVELS WHICH ARE ALREADY BEING MET OR EXCEEDED IN PRACTICE...BY TODAY'S MOTOR VEHICLES." REPRESENTATIVES FROM THE CAR AND TRUCK INDUSTRY TELL ME THAT IT IS VIRTUALLY IMPOSSIBLE FOR OPERATING ENGINES TO SIMULTANEOUSLY MEET THE LEVELS FOR NITROGEN OXIDE, CARBON MONOXIDE, PARTICULATES AND HYDROCARBONS WHICH ARE CONTAINED IN S. 2203. IN YOUR OPINION, ARE THERE ALREADY CARS ON THE ROAD WHICH ARE MEETING "OR EXCEEDING" THESE STANDARDS?

5. COULD YOU ALSO ELABORATE ON THE "BOOM-BUST" SCENARIO WHICH YOU PRESENTED IN YOUR TESTIMONY. I AM INTERESTED IN YOUR ANALYSIS OF THE DELETERIOUS EFFECT WHICH S. 2813 WOULD HAVE ON WESTERN MINES, ESPECIALLY IN COMPARISON TO THE EFFECTS WHICH YOU ENVISION FOR THESE MINES UNDER S. 2203.

II

99TH CONGRESS
2D SESSION

S. 2203

To establish a program to reduce acid deposition, and for other purposes.

IN THE SENATE OF THE UNITED STATES

MARCH 18, 1986

Mr. STAFFORD (for himself, Mr. MITCHELL, Mr. CHAFEE, Mr. DURENBERGER, Mr. HART, Mr. BAUCUS, Mr. MOYNIHAN, Mr. LAUTENBERG, Mr. KENNEDY, Mr. LEAHY, Mr. PELL, and Mr. DODD) introduced the following bill; which was read twice and referred to the Committee on Environment and Public Works

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A BILL

To establish a program to reduce acid deposition, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SHORT TITLE

SECTION 1. This Act may be cited as the "New Clean Air Act".

STATIONARY SOURCE CONTROLS

SEC. 2. (a) Section 111(a)(2) of the Clean Air Act is amended by adding the following new sentence: "The term 'new source' also includes any stationary source of emissions of sulfur or oxides of nitrogen within a category to which regulations under this section apply, on which such source construction has been completed for thirty-five years or more, beginning on January 1, 1991.".

(b) Part A of title I on the Clean Air Act is amended by adding the following new section:

"ACID DEPOSITION CONTROLS

"SEC. 129. (a) After December 31, 1991, each fossil-fuel-burning electric generating facility which is a major stationary source of emissions of sulfur dioxide shall operate for a total of no more than 3,000 hours, notwithstanding the remaining useful life of such source. In the case of any such source that attains an emission rate of 1.5 pounds of sulfur dioxide per million British thermal units of heat input or less, such source may operate for a total of no more than 10,000 hours. Any such source that attains an emission rate of 0.7 pounds of sulfur dioxide per million British thermal units of heat input or less shall have no limit on hours of operation or other restriction to operation in hours of peak demand under this subsection.

"(b) Not later than January 1, 1995, each major stationary source of emissions of oxides of nitrogen shall attain the degree of emission reduction attained by technology demonstrated to be available for application to existing sources, in any member country of the Organization for Economic Cooperation and Development. Not later than January 1[illegible]989, and no less often than every five years thereafter, the Administrator shall publish guidance documents identifying what degree of emission reduction has been demonstrated for various categories of sources.".

(c) Section 111 of the Clean Air Act is amended by adding the following new subsection:

"(k) Not later than January 1, 1988, the Administrator shall promulgate standards of performance for oil shale production and processing facilities, synthetic fuel production facilities, and other categories of major energy-production sources. Such standards of performance shall at a minimum control emissions of sulfur dioxide and oxides of nitrogen, and, notwithstanding subsection (a)(2), shall apply to any such facility on which construction or modification is commenced after January 1, 1986.".

MOBILE SOURCE CONTROLS

SEC. 3. (a) Section 202(b)(1)(A) of the Clean Air Act is amended by adding the following at the end thereof: "The regulations under subsection (a) applicable to emissions of hydrocarbons from light-duty vehicles and engines manufactured during and after model year 1990 shall contain standards which provide that such emissions may not exceed 0.16 gram per vehicle mile. The regulations under subsection (a) applicable to emissions of carbon monoxide from light-duty vehicles and engines manufactured during and after model year 1990 shall contain standards which provide that such emissions may not exceed 1.3 grams per vehicle mile.".

(b) Section 202(b)(1)(B) of the Clean Air Act is amended by adding at the end thereof the following new sentences: "The regulations under subsection (a) applicable to emissions of oxides of nitrogen from light-duty vehicles and engines manufactured during and after model year 1990 shall contain standards which provide that such emissions may not exceed 0.25 gram per vehicle mile.".

(c) Section 202(b)(1) of the Clean Air Act is amended by adding the following new subparagraph:

"(D) The Administrator shall promulgate regulations under subsection (a) applicable to emissions of particulates from light-duty vehicles and engines manufactured during and after model year 1990, and such regulations shall contain standards which provide that such emissions may not exceed 0.18 gram per vehicle mile.".

(d) Section 202(a)(3) of the Clean Air Act is amended by inserting after subparagraph (E) the following new subparagraphs and redesignating succeeding subparagraphs accordingly:

"(F) Regulations under paragraph (1) applicable to emissions from heavy-duty vehicles and engines manufactured during or after model year 1991 shall contain standards which provide that such emissions may not exceed 5.1 grams per brake horsepower-hour of oxides of nitrogen, 0.48 gram per brake horsepower-hour of hydrocarbons, and 2.5 grams per brake horsepower-hour of carbon monoxide of gasoline-fueled vehicles and engines, and 5.1 grams per brake horsepower-hour of oxides of nitrogen, 0.54 gram per brake horsepower-hour of hydrocarbons, 0.25 gram per brake horsepower-hour of particulates, except for buses for which emission of particulates may not exceed 0.1 gram per brake horsepower-hour, and 1.7 grams per brake horsepower-hour of carbon monoxide for diesel vehicles and engines. Such regulations shall apply to heavy-duty engines in all nonvehicular applications other than agricultural use.

"(G) Regulations under paragraph (1) applicable to emissions from light-duty trucks and engines manufactured during or after model year 1990 shall contain standards which provide that such emissions may not exceed 0.5 gram per vehicle mile of oxides of nitrogen, 0.19 gram per vehicle mile of hydrocarbons, 0.18 gram per vehicle mile of particulates, and 3.0 grams per vehicle mile of carbon monoxide. For the purposes of this subparagraph, the terms 'light-duty truck' and 'light-duty truck and engine' mean any motor vehicle (including the engine thereof) with a gross vehicle weight (as determined under regulations promulgated by the Administrator) of 8,500 pounds or less and a curb weight of 6,000 pounds or less as determined under regulations promulgated by the Administrator) and which—

"(i) is designed primarily for purposes of transportation of property or is a derivation of such a vehicle,

"(ii) is designed primarily for transportation of persons and has a capacity of more than 12 persons, or

"(iii) has special features enabling offstreet or off-highway operation and use.".

(e) Section 202(d)(1) of the Clean Air Act is amended by substituting for "five years or of fifty thousand" the following: "ten years or of one hundred thousand".

(f) Section 211 of the Clean Air Act is amended by adding the following new subsection:

"(h) After January 1, 1988, the sale of diesel fuel for use in motor vehicles, which fuel has a sulfur content in excess of the average sulfur content of gasoline sold in the United States during 1985, shall be prohibited. No later than January 1, 1987, the Administrator shall publish a determination of the allowable level of sulfur in diesel fuel under this subsection. Unless and until such determination is published, such allowable level of sulfur shall be 0.05 percent by weight.".

(g) After January 1, 1988, a vehicle emission control inspection and maintenance program required by section 172(b)(11)(B) of the Clean Air Act or, in areas where there is no such program operating, an inspection program required by applicable vehicle safety laws of a State, shall require emissions testing or direct inspection of components of vehicle emissions control systems (including inspection for evidence of misfueling) and where such components have been rendered inoperative, the replacement or repair of such components for systems or components related to the control of emissions of oxides of nitrogen.

(h)(1) Section 211(d) of the Clean Air Act is amended to read as follows:

"(d)(1) Any person who violates subsection (a) or (f) or the regulations prescribed under subsection (c) or who fails to furnish any information required by the Administrator under subsection (b) shall be subject to a civil penalty of not more than $10,000 for each and every day of such violation. Such civil penalty shall be assessed by the Administrator by an order made on the record after opportunity for a hearing. In connection with any proceeding under this section the presiding officer may issue subpoenas for the attendance and testimony of witnesses and the production of papers, books, and documents.

"(2) In determining the amount of a civil penalty, the Administrator shall take into account the gravity of the violation, the size of the violator's business, the violator's history of compliance, action taken to remedy the violation, and the effect of the penalty on the violator's ability to continue in business.

"(3) If a person fails to pay a civil penalty assessed under this subsection—

"(A) after the order making the assessment has become a final order and if such person does not file a petition for judicial review of the order in accordance with section 307, or

"(B) after a court in any action brought for judicial review has entered a final judgment in favor of the Administrator or the action has otherwise been terminated if such person has filed a petition for review under section 307, the Attorney General shall recover the amount assessed (plus interest from the date of the expiration of sixty days from the date of the order, or from the date of such final judgment, as the case may be) in an action brought in any appropriate district court for the United States. In such an action, the validity, amount, and appropriateness of such penalty shall not be subject to review.".

(2) Section 211(c) is amended by adding a new paragraph as follows:

"(5) Regulations under this subsection shall prohibit any person from introducing, or causing or allowing the introduction, of a regulated fuel or fuel additive into a motor vehicle not designed for such fuel or fuel additive.".

MISCELLANEOUS PROVISIONS

SEC. 4. (a) Section 114 of the Clean Air Act is amended by adding the following new subsection:

"(e) Not later than January 1, 1988, the Administrator shall implement (1) a system for monitoring dry deposition of acidic pollutants, including, in particular, monitoring in the Rocky Mountain region and other Western States, and (2) a system for monitoring lake chemistry and biological and chemical factors of watersheds, soils, and forests in portions of the Rocky Mountain region and other Western States likely to be sensitive to acid deposition.".

(b)(1) Section 126 of the Clean Air Act is amended by adding the following new subsection:

"(d) For the purpose of this section, it shall be deemed to be a violation of the prohibition of section 110(a)(2)(E)(i) if emissions of any air pollutant causes or contributes to a violation of a water quality standard established by a State under section 303 of the Clean Water Act.".

(2) Section 115 of the Clean Water Act is amended by adding the following new subsection:

"(e) For the purpose of this section, emissions of an air pollutant shall be deemed to cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare in a foreign country if such emission causes or contributes to a violation of a water quality standard or requirement established by such foreign country.".

(c)(1) Not later than January 1, 1987, the President shall institute negotiations with Canada and Mexico for the purpose of concluding a tripartite agreement—

(A) to minimize projected and existing levels of air pollution;

(B) to create an institutional framework to control sources of transboundary air pollution;

(C) to establish a North American air quality monitoring network;

(D) to encourage increased research and dissemination of information on air pollution control strategies; and

(E) to develop uniform minimum levels of protection for public health and the environment.

(2) The President shall undertake to enter into international agreements to apply uniform standards of performance for the control of the emissions of air pollutants. For this purpose the President shall negotiate multilateral treaties, conventions, resolutions, or other agreements, and formulate, present, or support proposals at the United Nations and other appropriate international forums.

(d) Not later than January 1, 1989, the Secretary of the Treasury, after consultation with the Administrator of the

Environmental Protection Agency, shall submit to the Committee on Environment and Public Works and the Committee on Finance of the United States Senate and the Committee on Energy and Commerce, the Committee on Public Works and Transportation, and the Committee on Ways and Means of the United States House of Representatives, a study, together with appropriate legislative proposals, on a system of tariffs on emissions adequate to encourage reductions in emissions of precursors of acid deposition and other forms of environmental pollution.

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THE NEW CLEAN AIR ACT

FRIDAY, SEPTEMBER 26, 1986

U.S. Senate,
Committee on Environment and Public Works,
Washington, DC.

The committee met, pursuant to recess, at 10 a.m., in room SD-406, Dirksen Senate Office Building, Hon. Robert T. Stafford (chairman of the committee) presiding.

Present: Senators Stafford, Chafee, Mitchell, Burdick, and Baucus.

OPENING STATEMENT OF HON. ROBERT T. STAFFORD, U.S. SENATOR FROM THE STATE OF VERMONT

Senator **Stafford.** Good morning, and welcome to the second in this series of hearings on air pollution and legislative proposals to reduce it.

Yesterday I observed that the witnesses and issues before the committee made it appear that it was business as usual. If that was true yesterday, it may be doubly true today.

This morning we will hear from the truck and automobile companies who were perennial witnesses before this committee in the 1970's when they repeatedly argued for a moratorium on the tailpipe pollution standards that were scheduled for later in the decade, and earlier in the next. The arguments advanced at that time were much the same as those that I expect we will hear this morning, namely, that the standards are difficult to impossible to meet; a marginal decrease in emissions is not worth the investment because there is no clear cause-and-effect relationship between the pollutants and health or environmental damage; and, finally, that it would be more efficient to obtain these reductions from smokestacks of the United States rather than tailpipes.

Not having heard the testimony, I hope I'll be surprised, and I hope to be disappointed. I also observed yesterday that, appearances to the contrary, this is not business as usual. This is particularly true with respect to pollution from cars and trucks. The standards contained in S. 2203 for cars and trucks are not impossible to meet. I say that because the standards are based on the levels for which the cleanest cars and trucks in the 1985 fleet were actually tested and certified. On the average, one out of every four vehicles approved by the U.S. Government for production in 1985 was meeting these standards.

It is true that the levels in S. 2203 were developed on a pollutant-by-pollutant basis. I expect we'll hear this morning all of the reasons why that's a wrong-headed approach. Personally, I am more interested in hearing how an eight-passenger station wagon with an eight-cylinder, 352 cubic inch engine, one of the largest on the road, can emit oxides of nitrogen at only 0.09 grams per mile. That's a 90-percent reduction from the current standard of 1 gram per mile, the standard which this committee was told 10 years ago was next to impossible to meet.

This Senator and the American people are interested in how to reduce pollution, not in the hundreds of speculative reasons why we should tolerate it. Clearly, the automobile manufacturers of the world know how we can further reduce pollution, perhaps by up to 90 percent for some chemicals and some cars. I hope this morning that they will share this with us.

And our first witness this morning will be Mr. Thomas Godar, who is vice president of the American Lung Association here in Washington. Mr. Godar.

He will be followed by Mr. Tom Kalitowski, executive director, Minnesota Pollution Control Agency.

Mr. Godar, as with all the witnesses this morning, we will place your full statements in the record. In view of the constraints of time, we would invite all of you to summarize your statements.

STATEMENT OF DR. THOMAS GODAR, VICE PRESIDENT, AMERICAN LUNG ASSOCIATION

Dr. GODAR. Thank you, Mr. Chairman, members of the committee. I am Dr. Thomas Godar, director of the pulmonary disease section at St. Francis Hospital and Medical Center in Hartford, CT. I am also associate professor of medicine at the University of Connecticut and at Yale, and in the active practice of chest medicine. I speak not only for the Lung Association family, but as a treating physician in the community. I am currently vice president of the American Lung Association and former chair of the National Air Conservation Commission.

I am presenting comments today on behalf of the American Lung Association. The ALA is the Nation's oldest voluntary health association. This year represents the 20th anniversary of ALA's National Air Conservation Commission, which directs the organization's programming efforts to prevent and control air pollution.

We believe that a review of the scientific literature on air pollution demonstrates very clearly the contribution of air pollution to the development and/or exacerbation of various lung diseases. It is on the basis of our knowledge of the adverse health effects of air pollution that the ALA places high priority on preserving and strengthening the Federal Government's air pollution control program. Of particular concern is the reauthorization of the Clean Air Act to continue the progress toward clean and healthful air quality in all regions of the country.

Since the beginning of the current reauthorization debate in the early 1980's, striking advances have occurred in the information concerning health effects in humans from experimental exposures to the so-called criteria pollutants.

Witness, first, the demonstration that, when combined with intermittent heavy exercise, exposure to ozone levels as low as 0.12 parts per million can cause symptoms of airways irritation and decreased vital capacity in normal subjects, and I emphasize normal subjects. Although these changes appear to be reversible, more prolonged effects are evidenced by the phenomena of adaptation to serial daily ozone exposures and of increased postozone airways responsiveness to challenge with inhaled bronchoconstrictor aerosols. I would clarify that bronchoconstrictor aerosols are agents designed to be specific irritants and identify overreactive airways in humans.

Witness, also, the demonstration that asthmatic subjects exposed to sulfur dioxide levels as low as 0.25 parts per million for exposure periods as brief as 5 minutes, when performing voluntary isocapnic hyperventilation or during exercise-induced hyperventilation, can develop symptoms and objective evidence of bronchoconstriction—in other words, airway narrowing producing a reduction in function. I might identify isocapnic hyperventilation as an effort to increase breathing without changing carbon dioxide levels by providing carbon dioxide to keep the level constant and eliminate that as another variable in the experimental study to see what the factors are that change function.

The reporting that sulfuric acid aerosols and nitrogen dioxide also provoke bronchoconstriction in exercising asthmatics exposed at concentrations near or within current levels of ambient air pollution, is another bit of striking current evidence.

The evidence documenting effects from exposures to sulfur dioxide is most striking and fairly extensive. This is quickly demonstrated with a short review of the current findings. Studies numbering over 30 in the last several years clearly demonstrate that asthmatics are much more sensitive to sulfur dioxide as a group, and that there is a broad range of sensitivity to sulfur dioxide within this group.

I might point out that asthmatics may represent between 5 and 8 percent of the population in this country.

Time does not allow me to review the results of this body of scientific evidence in any detail, but the American Thoracic Society, ALA's medical section, is preparing the third monograph in a series on the health effects of air pollution, which includes this detailed information. We will, of course, make it available to the committee when it is published.

S. 2203, the New Clean Air Act, by providing for reductions in total emissions of sulfur compounds as well as emissions of other criteria pollutants, is likely to have substantial public health benefits. For example, reduction in emission rates at sources controlled under the provisions of this bill will reduce the magnitude and the frequency of short-term sulfur dioxide exposures caused by these sources. Also, by reducing sulfur dioxide emissions, concentrations of sulfate particulate matter will be reduced, resulting in fewer morbidity effects. However, to sufficiently protect public health—including the sensitive population of asthmatics—current findings document the need to limit exposures to less than 0.5 parts per million and for durations of no more than 5 to 10 minutes. Translation of this into a short-term standard, including provision for an adequate margin of safety, would require a standard in the range of 0.25 parts per million.

In addition to the general emissions reductions required in S. 2203, we encourage the committee to consider inclusion of the existing Clean Air Act mechanism of national ambient air quality standards to provide definitive health protection. The national ambient air quality standards for sulfur dioxide must be strengthened by the addition of a short-term standard to ensure protection against adverse health effects at all locations in the United States. The national ambient air quality standards provide a primary mechanism for guaranteeing health protection. ALA firmly believes that these standards are an essential component of any program designed to protect public health, including sensitive populations, who happen to be a major constituency of the ALA.

I would like to conclude my comments by drawing the committee's attention to other critical areas of need in air pollution control not addressed in the proposals before you. ALA has been concerned for some time that Congress has not addressed the reauthorization of the Clean Air Act from a comprehensive point of view. To maintain a balanced, effective air pollution control program, the committee should consider expanding the legislative scope of concern. We believe that there are several provisions of the act with significant public health benefits which should receive the attention of Congress.

First and foremost is the nonattainment program. The Clean Air Act contains a series of deadlines for the attainment of ambient air quality standards, the last being December 31, 1987. EPA currently projects that between 32 and 45 areas of the country will not meet the deadline for ozone.

We believe that Congress should review the current program requirements and provide for additional mechanisms in the program for nonattainment areas to ensure that these areas are required to develop adequate programs to attain the standards as rapidly as possible. Over 115 million people reside in nonattainment areas, with approximately 20 percent considered to be sensitive populations in the NAAQS provisions, further adding to the urgent need to improve the program.

We understand that EPA is developing a strategy to address the ozone nonattainment problem. EPA's approach fails to ensure that the continuing nonattainment problems will be resolved promptly and consistently across the country. Accordingly, this significant public health problem requires legislative remedy.

A second area of our concern is the need for change in section 112 for the control of hazardous air pollutants. The mechanisms currently in the act have not worked as Congress intended. Substantial delays in the listing and standards development process have plagued this program. The problems have been well identified in previous hearings; rather than accepting EPA's very limited approach to addressing this public health problem, Congress should—as part of a comprehensive reauthorization strategy—revise this program to provide for a more timely process for listing and standards development.

As you continue your consideration of S. 2203, ALA encourages you to consider provisions which incorporate a comprehensive reauthorization of the Clean Air Act. ALA will continue to offer its scientific and medical expertise to assist in assessing the complex health issues and appropriate changes in the act to resolve these problems.

I want to thank you for this opportunity to comment. I'd be happy to respond to any simple questions that a clinician could address, if you have them.

Senator **Stafford**. Thank you very much, Dr. Godar. I'm going to break here for just a minute since two of my colleagues have arrived, and ask Senator Chafee if he has any opening statements.

Senator **Chafee**. No, I don't.

Senator **Stafford**. Senator Mitchell.

Senator **Mitchell**. I do not, Mr. Chairman.

Senator **Stafford**. All right.

Dr. Godar, I take it from your testimony that you believe that the current standards for both ozone and sulfur dioxide are so weak as to be in violation of the law. Is there any doubt in your mind, based on the human and animal studies done to date, that the current levels of air pollution are causing human health damage?

Dr. **Godar**. There is no doubt in my mind whatsoever.

Senator **Stafford**. All right. Thank you.

Do you have any questions, Senator Chafee?

Senator **Chafee**. I do, Mr. Chairman.

In your statement you say that in the United States, over 115 million people—now, that's half our population—reside in nonattainment areas, with approximately 20 percent considered to be sensitive populations. I find that figure astonishing. You're saying one out of every five people in the United States—you're talking half the country, here—are sensitive?

Dr. **Godar**. Yes; there's very good data now, and even conservative interpretation tells us that 20 percent of the population are what we call hyperreactors. Their bronchial system is more reactive than the average to irritants. Of this 20 percent, it's estimated currently by experts that only 40 percent of that group will ever develop asthma in the course of a lifetime, or any symptoms consistent with that. Nevertheless, 20 percent are potential asthmatics. ALA's concern is not just the control of disease but the prevention of disease.

My experience as a clinician tells me that that data is sound. As I observe people in a closed society that I can observe carefully, decade after decade—I think, for example, of my own medical staff—I find the number of people currently taking medication for some form of asthmatic problem increasing at an alarming rate as they age, and I think the 20 percent sensitivity estimate is at the very least accurate and may even be underestimating the sensitive group. And 40 percent of that group will at some point—that is about 8 percent of the population—will at some time in their lifetime suffer from some form of asthma.

Senator **Chafee**. Well, I obviously don't have assembled statistics, and I'm supportive of this legislation. I just don't want us to have statistics that overstate our case. I'm not suggesting that yours do; it's just from my own personal experience that I would be surprised if it were as high as one out of every five people.

You point out that that doesn't mean they're asthmatic, but they potentially could be asthmatic. Is that your point?

Dr. GODAR. That's correct. They're regarded as hyperreactive, and they're more likely to react in the bronchial system rather than the lung itself to irritants in the ambient air. For example, we have joggers who have quietly modified their jogging habits without discussing it with anyone because they find they cough and they can't perform when jogging at certain times of day along major thoroughfares. They have quietly decided to join their friends on the periphery of the reservoir and run early in the morning. They don't know why they are doing better there, but the reason is because the ozone levels are lower. As a matter of fact, it's probably suicidal to be a jogger in the first place; it's a form of body punishment, speaking from a personal viewpoint.

But many of us are masochists, and physicians in general are masochists, so we understand that.

But if you are going to jog and beat your body up, for Heaven's sakes, don't beat up your lungs. And these perfectly healthy, young, vigorous people are having problems running at standard rates at certain times of the day.

Senator CHAFEE. I think anybody that would jog along Pennsylvania Avenue at 8 to 9:30 in the morning is going to suffer from some bad air. But the only reason I'm raising this is that I want us to have as good and solid a case as we can, and I'm just skittish of overstating our case. Obviously, you've got these statistics, but I want to make sure our statistics are right.

Dr. GODAR. Yes; these are from EPA documents. These are fairly well substantiated.

Senator CHAFEE. All right. Thank you.

Senator STAFFORD. I think, Doctor, it might be well, since my colleagues came in after we started, if you restated your own responsibilities as a doctor and your professional qualifications.

Dr. GODAR. I am currently the vice president of the American Lung Association, former chair of the National Air Conservation Commission, a long-time activist in air quality in Connecticut, which happens to be one of those States that is not in compliance and probably will not be as it should in future years. But primarily I'm a clinician with a concern about my patients, with about 20 years of personal concern during which time I've seen my colleagues become more concerned and more aware of this problem than they were even 5 years ago. The information seems to have become rather generally accepted by the medical profession in spite of the fact that many physicians couldn't even think of one or two pollutants by name 10 years ago, and they still have a little trouble spelling some of them.

Senator STAFFORD. Thank you.

Senator Mitchell?

Senator MITCHELL. Thank you, Mr. Chairman.

Doctor, in your judgment, is the control of the precursors of acid rain—specifically, emissions of sulfur dioxide and nitrogen oxides—necessary to protect the public health in this country?

Dr. GODAR. I have no doubt of that whatsoever. The information on sulfur oxides and the particulates that always accompany it—and if you look at the subsequent chemicals that are generated, it seems very clear that almost every study has documented a direct relationship between SO_2 levels and overall mortality. Now, I think morbidity is one thing; if you can relate disease to an exposure, that's interesting and relevant. But if you can carry it to the point of death, I think that underscores the significance of this very pervasive pollutant.

Yes, acid rain does not seem itself to do anything to the human body or to human health as such. The precursors have been very dangerous, well documented for many decades.

Senator MITCHELL. Are you able to estimate in any way the cost to this Nation of not controlling the emissions of sulfur dioxide and nitrogen oxides—that is, the cost to the American public in health or other terms?

Dr. GODAR. Well, there have been many estimates, from as low as several hundred million to several billion. It's a very difficult thing to do. As a matter of fact, I have trouble even understanding how much my patients are spending for the medications that I'm ordering, but medical care is very expensive. A hospitalization induced by an exposure in a sensitive individual may, in fact, represent thousands of dollars. So I think the cost is hidden; not well-appreciated, but massive.

Senator MITCHELL. Would you undertake for this committee to review the data that exists, published materials, and see if you could provide us with your best estimate of that cost, in writing at a later time?

Dr. GODAR. I'd be happy to do that. I'll work with our people and we'll go through the data and use our experts in ATS to provide that material for you.

There are some publications; there are some texts that have been published in recent years, but none to my knowledge within the last 2 years, and you would certainly want current data because health costs are changing dramatically.

Senator MITCHELL. Can exposure to sulfur dioxide and nitrogen oxides produce some of the same effects as cigarette smoking?

Dr. GODAR. Yes.

Senator MITCHELL. Then in your judgment, from a health standpoint, does it make any sense for this country to place warnings on tobacco products and to spend some huge sums of money to discourage people from smoking, while doing nothing to control emissions of pollutants, exposure to which causes the same effects?

Dr. GODAR. No; I think to do nothing would be immoral and unethical. I find it's not pleasant to argue the case for air quality because there are many people who don't believe that it's a problem, and economically one encounters rather massive opposition. So it's not exactly a pleasant campaign, but I feel an obligation to make myself accessible and to take the blows and to speak at public hearings because I strongly feel that it's a serious problem and that the individual citizen is not given an option. I have an option whether I will kill myself with cigarette smoke or not, but I don't have an option as to whether I will or will not breathe the dirty air. I have no choice.

For that reason, because I think it is so pervasive, that you're talking about a commodity you can utilize for a lifetime; because it is changing in a way that you can't control; because a good part of the population is, in fact, quite sensitive; because it involves the elderly and it even involves the young, active, exercising child whose gas exchange is much higher than the average adult, who is much more active, and who is intensifying the exposure throughout their playing, growing lifetime. Add to this the fact that their body is in a state of growth and their cells are much more susceptible to all of the carcinogenic effects, as well as the toxic effects pollutants.

So I think for pediatricians, this would be a particularly serious concern.

Senator MITCHELL. Dr, in your written testimony you stated that new data on the adverse health effects of exposure to air pollutants has been completed or made available since the Clean Air Act was last reauthorized.

Dr. GODAR. That's correct.

Senator MITCHELL. Yesterday one of the witnesses testified that the current Clean Air Act is sufficient to provide adequate air quality, that he is in opposition to any changes proposed in the legislation being considered. In light of the fact that you have testified that new data on the adverse health effects of exposure to air pollutants has been made available since the Clean Air Act was authorized, may I take it that you would disagree with the assessment of the witness—at least one witness yesterday—that the Clean Air Act is more than sufficient and we don't need to do anything else?

Dr. GODAR. I would disagree entirely with that stand, yes.

Senator MITCHELL. All right.

Dr. GODAR. The research scientists—who are very conservative, as you well know, and must remain very conservative—are the last to come aboard in terms of concern about human health. They want to see the data piled sky-high before they will take a position. I often accuse them of not getting of their fat behinds and getting it before the public as scientists if they have a personal concern. They wait until the data is sky-high or until the bodies are on the streets before they decide that there really is a problem.

Now, they do this to preserve their integrity as scientists, and I understand that. But when they begin to show concern, when they go into the laboratory and do isolated experiments with a cynical view to finding nothing and suddenly discover that in fact we have underestimated the risk, when I see these very conservative, knowledgeable scientists beginning to raise their eyebrows and show concern, not as patient-treating physicians but as researchers, that tells me that the data is there. And they're beginning to uncover things that actually lead me to believe that the initial estimate of harm was an underestimation. It was done for the purpose of caution, and because the data available when the initial Clean Air Act was enacted was, in fact, very limited. We admit that. The ambient air quality standards were our best "guesstimates." They've been criticized for lack of supporting data in many cases, but I would tell you that the newer data not only supports many of the initial levels that were established but suggests they ought to be lowered. The problem is deeper than we estimated.

Senator MITCHELL. Mr. Chairman, yesterday more than one of the witnesses' testimony contained statements to the effect that over the period of several years, there had been a decline in emissions of sulfur dioxide and nitrogen oxides in this country. And to merely highlight the doctor's testimony, I just want to point out for the record in the event it was not pointed out yesterday that, in fact, emissions have increased in the past 2 years. While it is true that if one reaches back for an earlier baseline year one may establish that there has been a decline over time, the most recent trend in the last 2 years is an increase in emissions. I think, in the light of Dr. Godar's testimony, it indicates that the urgency for legislation of the type being considered is even greater now than it was 2 years ago.

Thank you very much, Doctor.

Thank you, Mr. Chairman.

Senator STAFFORD. Thank you, Senator Mitchell. I think that's a good point.

Thank you, Dr. Godar. We would invite you, if you can, to stay and hear other witnesses, but we understand if you have other things you have to do.

The next witness will be Mr. Tom Kalitowski, who is executive director of the Minnesota Pollution Control Agency. Mr. Kalitowski?

STATEMENT OF THOMAS J. KALITOWSKI, EXECUTIVE DIRECTOR, MINNESOTA POLLUTION CONTROL AGENCY

Mr. KALITOWSKI. Good morning, Mr. Chairman and Senators. For the record, I am Tom Kalitowski, director of the Minnesota Pollution Control Agency, and I want to thank you for this opportunity to provide the committee with Minnesota's views and concerns regarding acid deposition control legislation, and to share with you our recent accomplishment of promulgating an acid deposition standard and control plan for the State of Minnesota.

As you know, acid deposition is of great concern to Minnesotans. The same glacial action that sculpted our landscape and left us blessed with thousands of sky-blue lakes and streams and millions of acres of beautiful and productive forests also left us with an environment that is highly sensitive to acid deposition. This is because the glaciers, through their scouring action, left very thin soils and exposed bedrock, both of which have low capacities to neutralize acid deposition.

The EPA recently released the results of their multimillion dollar National Lake Survey. Those results showed that Minnesota was one of five States that had over a thousand lakes that are susceptible to acid rain. We in Minnesota have been studying the impacts of acid rain since 1978, and our own studies indicate that about 2,500 of our lakes are susceptible, including 25 percent of the State's lakes that are classified as fishing lakes.

We have also found that we have trout streams, wetlands, and peatlands that are susceptible to acidification, endangering habitats for stream trout, waterfowl, and many rare or endangered plant species. In addition, although less sensitive than lakes, we have millions of acres of forest soils that may be susceptible to acid deposition.

Let me describe now for the committee the rulemaking process that we have just completed that resulted in the promulgation of an Acid Deposition Standard and Control Plan, because much of what we have learned through that process relates to my comments on proposed Federal legislation.

In 1982, the Minnesota Legislature passed a law that required a formal inventory of sensitive resources and the promulgation of an Acid Deposition Standard and Control Plan by 1986.

At the time this bill was passed, many critics said that we do not know enough about the science of acid rain to promulgate standards or to develop control plans. I know that you have been hearing similar comments about Federal action. I think our hearing record and the findings of fact of the administrative law judge who presided over the hearings puts that tired excuse to bed; for the fact is, we do know enough to take reasonable, necessary action.

In order to successfully promulgate our standard and control plan, we had to demonstrate the need and reasonableness of our proposed regulations. After a rulemaking hearing that spanned the course of 5 months, included the testimony of 75 expert witnesses from around the world, and generated 6,000 pages of transcripts and over 1,000 exhibits, the administrative law judge determined that we did indeed demonstrate the need and the economic as well as scientific reasonableness for acid rain controls. Specifically, the judge stated that while there remain questions concerning the causes, sources, and effects of acid rain, there is enough known to conclude that acid rain must not continue unabated.

As a result of these hearings, Minnesota adopted an acid deposition standard of 11 kilograms per hectare per year of wet sulfate deposition, and a control plan that will require reductions in emissions from 1980 levels, similar to the reductions that would be required in Minnesota by nearly all of the proposed Federal legislation to date.

Our regulations, coupled with the actions taking place in New Hampshire, New York, and Wisconsin, should demonstrate that we do have enough scientific basis to begin regulating acid rain. Despite the enormous difficulty of unilateral action, four States have, through their actions, demonstrated the importance of this issue. However, it is clear that while individual State action is important, national action is critical.

With that background information in mind, I would now like to offer comments on provisions in two bills in front of this committee, S. 2203 and S. 2813. While both of these bills are different, both seek the same important goal—protection of the environment through major reductions in acid-forming emissions.

First, we believe that reductions in sulfur dioxide emissions on the order of about 50 percent are necessary. Both bills accomplish this goal in different manners; S. 2203 results in greater reductions in emissions, which is desirable, but at significantly greater immediate costs, while the reduction approach in S. 2813 appears to allow more flexibility and, thus, lower immediate costs.

Second, both bills require modest reductions in nitrogen dioxide emissions. We have learned through our hearings that the science on the effects of nitrogen oxides and nitric acids on the acid rain problem is not yet as advanced as it is for sulfur compounds. We do support nitrogen oxide emission reductions, but would hate to see reductions in sulfur dioxide emissions held up in Congress over arguments about nitrogen oxide emissions.

Third, we prefer to see all States included in the reduction requirements. Our own studies have shown that States like Texas, North Dakota, and Wyoming are more important contributors to acid rain in Minnesota than States like Ohio or West Virginia. While the 31-State approach in S. 2813 will significantly reduce deposition in Minnesota, a 48-State approach—as in S. 2203—is more desirable.

Fourth, we believe a permanent ceiling or cap on emissions is warranted to ensure that emissions do not slowly creep back up in the future. Although plant replacements and new technology breakthroughs may limit emissions growth, an emissions cap would encourage applications of new technology and protect the important emission reductions we are fighting so hard to achieve. We believe S. 2203 properly addresses this concern in section 2(a).

Finally, we believe that strengthening language should be added to the existing provisions in the Clean Air Act for interstate transport of pollutants. Current provisions do not recognize acid deposition as a pollutant. As a result, legitimate legal action taken by many States—including Minnesota—has been impeded. Sections 110 and 126 must be strengthened to ensure that one State is prevented from emitting air pollution which could endanger public health or welfare in another State, regardless of violations of ambient standards. Modification of these sections of the act becomes even more important if acid rain legislation is not applied to all States. In addition, such modifications would be of benefit in future actions regarding air toxics, an issue of growing importance and concern; S. 2203 addresses this issue in part under the miscellaneous provisions.

Our experience in Minnesota in promulgating an acid deposition standard and control plan has provided important insight into this complex and controversial issue. We have demonstrated that there is enough known to begin reasonable controls to reduce acid deposition. We have done what the EPA and many others said could not be done. We have related the sources of acid rain to environmental effects. We put acid rain on trial, and sulfur dioxide was found guilty of harming the environment. We also demonstrated that the costs of controls are far overshadowed by the benefits.

Mr. Chairman, I want to thank you again for this opportunity to offer comments. In addition to my testimony, I have brought a copy of our acid rain rule and the findings of fact of the administrative law judge for the record. We will be happy to assist the committee in assessing any issues relating to this important legislation, and I wish you well in your efforts to pass an effective acid deposition control program.

[The material referred to has been retained in committee files.]

Senator **STAFFORD**. Thank you very much, Mr. Kalitowski.

I note that another of my colleagues has now joined us. Senator Burdick, do you have any opening statement you wanted to make?

Senator **BURDICK**. I certainly do.

What is this reference you had in North Dakota?

Mr. **KALITOWSKI**. Senator Burdick, as part of our process in developing an acid rain program in Minnesota, we did computer modeling to attempt to determine just where the deposition that falls in Minnesota comes from. And, quite frankly, we were very surprised by the results. Where it was always assumed that it was the States from the East that were the heaviest contributors because of the industries, we found that the No. 1 contributor to the State of Minnesota was the State of Texas, the No. 2 contributor was the State of Missouri; and among the top 10 contributors was our sister State of North Dakota.

Senator BURDICK. You better check that once more, and I'll tell you why. I don't think there's another State in the Union that has the degree of scrubbing that North Dakota has. I believe we're almost perfect. Every powerplant we have, but two, has scrubbers on it right now. There was one plant that didn't, and the result was that it had to be taken off the line. But all our production now is scrubbed.

Do you know of any other State that has done that?

I don't know how this is possible.

Mr. KALITOWSKI. Mr. Chairman, Senator Burdick, we in Minnesota also have scrubbers on almost all of our plants and, frankly, our computer modeling found that we were guilty of contributing significantly to some of the sensitive resources in the State of Wisconsin. It's really as much a factor of the location of the resources and the location of the sources of emissions that have resulted in some of those findings.

Senator BURDICK. Well, if scrubbing won't take care of it, then we'd be compared with other areas that don't scrub at all. Are we still guilty? What more can we do?

Mr. KALITOWSKI. Mr. Chairman, Senator Burdick, obviously I can't—I don't have the specific information on the plants or locations, but it is information that I'm sure we could provide to you at least in terms of what our computer models show.

Senator BURDICK. We've spent 25 percent of the cost of construction on scrubbers in our plants in North Dakota; we've done everything known to science at the moment. I don't know what else we can do, I really don't, unless you have new plans up your sleeve.

I take issue with your statement because we've done everything we could do in North Dakota.

Senator STAFFORD. Thank you, Senator.

Mr. Kalitowski, in your statement, you've frequently noted the susceptibility of lakes and possibly of forest lands in Minnesota, but I didn't hear you say that you had observed actual damage from acid rain in many of your lakes. In fact, has there been actual damage?

Mr. KALITOWSKI. Mr. Chairman, there has not been actual, observable damage in the State of Minnesota, and I'm here to say that I hope there never will be.

Senator STAFFORD. All right.

One question that's arisen several times during our hearings is whether the United States should act to control acid rain despite the fact that utilities in Canada have thus far installed no scrubbers. I note that you've gone ahead and chosen a stringent pollution reduction program even though Canada has not yet acted. Do you believe it would be unfair for this country to adopt an acid rain program even though there are currently no scrubbers in Canada?

Mr. KALITOWSKI. Mr. Chairman, I think it's extremely important that we work both with Canada and Mexico to encourage a more comprehensive solution. On the other hand, just as Minnesota felt we couldn't stand by and observe our resources being threatened, I think that the United States has to move ahead even if that agreement isn't in place.

Thank you, Mr. Chairman.

Senator STAFFORD. Well, we have some other Senators who might want to ask questions.

Senator Mitchell.

Senator MITCHELL. Thank you, Mr. Chairman.

Mr. Kalitowski, you said that the costs of controls are far overshadowed by the benefits. Could you elaborate on that statement either in dollar terms or in any other form of measurement?

Mr. KALITOWSKI. Mr. Chairman, as you may have observed from my more lengthy comments, we did attempt to quantify some of the values associated with Minnesota's resources. And I should point out that the number one industries in Minnesota — the three top industries are agriculture, forestry, and tourism are threatened by acid rain. Because, for example, we found 25 percent of our fishing lakes in the State of Minnesota to be susceptible to acid rain, we were able to attempt through our department of tourism to try to put some dollar figures on those values.

The figures we came up with are in a broad range and, in fact, the numbers that I put in my statement were that the annual benefits were somewhere between $78 million and $260 million per year, which is far in excess of the costs of the controls which we imposed in Minnesota. And again, there are so many esthetic and other values that almost defy quantification that this was necessarily a difficult exercise; but we felt, because of the arguments during our hearing process, that it simply wasn't economically feasible to go ahead with controls, that we had to produce some evidence. We produced a consultant's report that I think did as good a job as could be done at trying to quantify what in some cases is unquantifiable, and even put it into specific dollar figures.

Senator MITCHELL. Would you make that consultant's report available to this committee?

Mr. KALITOWSKI. I'd be very happy to.

Senator MITCHELL. Is there any doubt in your mind that were a similar process to be followed nationally, that the statements you made would still hold; that is, the cost would be far overshadowed by the benefits?

Mr. KALITOWSKI. Mr. Chairman, Senator Mitchell, absolutely. The differences would be staggering, particularly because of some of the areas in the East where there actually already is observable forest damage and lake damage, and I'm sure the numbers would be even much harder than in a State like Minnesota where we really haven't yet seen the specific damage.

Senator MITCHELL. In one other area of your testimony you expressed a preference for the provisions of S. 2813, which permit more flexibility in achieving reductions. And I wonder if you could elaborate on it a little bit. There are two approaches to the problem, of course. Legislation that I introduced initially several years ago requires a specific reduction nationally, apportioned among the

States in accordance with their emissions, but then leaves it up to the State to make the judgment as to how best that should be achieved. I gather it is that approach that you express a preference for as opposed to mandating a specific technology or method of achieving reductions nationally?

Mr. KALITOWSKI. Mr. Chairman, Senator Mitchell, that's precisely the approach we took in Minnesota in developing our plan. We did consider plant-by-plant site-specific control mandates. We spent a lot of time in working with the regulated community in trying to identify the benefits and costs and so on, and it was our conclusion that by allowing that greater flexibility we could achieve the same benefits at a lower cost.

Senator MITCHELL. Is there any doubt in your mind that the same conclusion would hold were the same process to be applied nationally?

Mr. KALITOWSKI. I can't speak first hand, but I suspect that it would.

Senator MITCHELL. All right. Thank you very much, Mr. Kalitowski.

Thank you, Mr. Chairman.

Senator STAFFORD. Thank you.

Senator Burdick.

Senator BURDICK. I'm trying to figure out what this difference is between you and me, and is a possible reason.

One mile north of our northwest border is a huge powerplant operated by Canada. The winds in that area are northerly or northwesterly, and they blow from that part of Canada down into the State.

Is it possible you could be measuring that kind of pollution instead of the North Dakota pollution?

Mr. KALITOWSKI. Senator Burdick, I certainly would like to say that's possible. The computer modeling suggests that it is North Dakota sources, and I'm sorry I don't have the information today where I could refer specifically to the plants.

Senator BURDICK. If you've employed the latest technology and discovery technology on your plants, what more can you do today?

Mr. KALITOWSKI. Mr. Chairman, when you talk about the latest technology in scrubbers, there are a number of factors that go into the emission, including, of course, the fuel that is used, the conditions under which it's burned, and the scrubbers. And so, unless I knew the actual emission rates of the plants, it's hard to answer that question.

Senator BURDICK. Well, you're going to hear from me some more on this one. Thank you.

Senator STAFFORD. Thank you very much, Mr. Kalitowski. There may be some questions in writing from some of the Members who can't be here this morning. Would you be willing to answer them?

Mr. KALITOWSKI. Mr. Chairman, I'd be pleased to.

Senator STAFFORD. All right. Thank you very much.

The next witness will be Mr. David Doniger, natural resources defense council, speaking on behalf of the National Clean Air Coalition. Mr. Doniger, we would be glad to hear from you.

STATEMENT OF DAVID DONIGER, SENIOR ATTORNEY, NATURAL RESOURCES DEFENSE COUNCIL, REPRESENTING NATIONAL CLEAN AIR COALITION

Mr. DONIGER. Thank you, Mr. Chairman.

Mr. Chairman, members of the committee, sharp further reductions are needed in all six of the major pollutants from motor vehicles and fuels. Each of these pollutants— hydrocarbons, carbon monoxide, oxides of nitrogen, particulate matter, sulfur, and lead—continues to endanger public health and welfare. Sixteen years after the Clean Air Act was passed, half the U.S. population, according to the EPA, still lives in areas with unhealthy, dangerous levels of air pollution, and the long-distance transport of pollution is still destroying lakes, forests, crops, buildings, and other manmade materials.

Motor vehicles remain one of the largest contributors to these serious pollution problems. Hydrocarbons from tailpipes, from vehicle refueling, and from fuel evaporation cause violations of the health standard for ozone in most of the Nation's large urbanized areas, up to 45 of which will not meet that standard by the end of 1987. Carbon monoxide levels, which are dominated by vehicles, still exceed safe levels in cities that are home to tens of millions of people. Vehicular NO_x emissions contribute to violations of the standards for nitrogen dioxide and ozone, and to acid deposition. And diesel particulate emissions, which are projected to rise steadily even under EPA's standards, are already causing as many as several hundred lung cancer cases and thousands of cases of respiratory disease each year. Lead in gasoline is still endangering tens of thousands of children, and sulfur in diesel fuel contributes to unhealthy SO_2 levels in urban areas and acid rain.

As Dr. Godar has testified, as if this situation were not bad enough, EPA will soon have to tighten the ambient standards for four of these pollutants because the most up-to- date scientific studies show that asthmatics, children, and even healthy adults are harmed at much lower pollution levels than previously documented. The ozone standard needs to be reduced by as much as a third. Tight 1-hour standards are needed for both sulfur dioxide and nitrogen dioxide, and the new particulate standard, focused on smaller particles, also must be more stringent than the current standard.

I would add, in response to Mr. Chafee's concerns, that EPA has told us in briefings that it expects approximately 80 million people to be in the persistent nonattainment areas that last beyond 1987, and that it considers 30 million of those people to be sensitive to air pollution.

It is with this sense of the urgent public health and environmental need that the National Clean Air Coalition reviews the mobile source provisions of S. 2203. We strongly support the bill's strengthened emission standards for hydrocarbons, CO, and NO_x for autos and light trucks. The time has come to reorient the auto emission controls to what the best performing cars can do, not the worst. The feasibility of these standards has already been demonstrated; using the latest catalyst technology, fuel injection systems, and electronic computer controllers, one-fourth of current engine families—both big cars and small—have shown that they can already meet or better these standards. There's no reason why the rest of the fleet can't match these leaders.

The bill's particulate standard for diesel cars and light trucks, however, needs to be tightened. California already limits diesel particulate to 0.08 grams per mile, which is 60-percent less than the EPA standard. The EPA standard is so lax that many diesel cars and light trucks are certifying to meet the standard without any tailpipe pollution controls. The standard in S. 2203 should be tightened at least to the California level.

The Coalition supports other important requirements in the bill, such as removing lead from gasoline and sulfur from diesel fuel. There is just no excuse for continuing to expose children to any lead from auto exhaust. And EPA studies show that removing sulfur from diesel fuel would save each diesel truck owner hundreds of dollars per year in maintenance expenses that are now devoted to combatting corrosion and wear, to say nothing of the substantial health and environmental benefits from taking that sulfur out.

The coalition supports the bill's inspection and maintenance program for nitrogen oxides, and likewise we support extending the official "useful life" of light-duty vehicles to 10 years or 100,000 miles. Pretending that cars operate for only 5 years or 50,000 miles is like pretending people live for only 35 years.

The coalition supports the standards proposed for hydrocarbons and carbon monoxide emissions from heavy-duty vehicles, but the bill's provisions for heavy-duty diesels need to be greatly strengthened. The emission numbers in the bill for diesel trucks and buses are, in several instances, weaker than the EPA regulations currently on the books, and those EPA standards don't comply with the requirements of the current Clean Air Act.

The present law requires EPA to set truck and bus standards based on the capabilities of the technological leader. Engines that need more time to meet those levels are able to stay on the market under nonconformance penalties that provide a financial incentive for rapidly cleaning up. EPA has totally ignored this directive for leader-based standards and based its standards for trucks and buses on the technological laggards. Consequently, NRDC, the State of California, the American Lung Association, the Sierra Club, and others have challenged those standards in court, and a decision is expected soon.

According to EPA's own analysis, leading diesel engine makers have the means to get to levels as low as 0.1 grams per brake horsepower hour—the unusual unit of measurement used for trucks and buses—along with a NO_x standard as low as 3. grams, by as early as 1990. The standards proposed in the bill, therefore, are too lax.

A separate, more protective standard should be set for NO_x emissions from gasoline-powered trucks. These trucks could meet a NO_x standard of 1.7 grams.

S. 2203 should also include a requirement to convert diesel city buses and other centrally fueled large fleets to methanol. Methanol is a fuel which allows a diesel engine to burn much cleaner than with conventional diesel fuel. NO_x emissions are very low, and particulate matter is virtually eliminated.

Other pollution control measures for vehicles and fuels are absolutely necessary to protect the public health and the environment, and should be required by this bill. One of them is a measure to control emissions of fuel vapors when fueling up at the gas station. This can be done in two ways, with controls on the pump—which are required in California, and here in the District, and soon will be in St. Louis and in New Jersey—or with a control on the car itself. The vapors are large contributors to the ozone smog problem. Both measures to control them are very inexpensive; less than a penny a gallon of gas for the controls on the pump, and less than $15 to $25 for controls on board the car itself. Both should be required by the bill.

In addition, the volatility of gasoline—its propensity to evaporate—needs to be greatly reduced. The volatility has been going up sharply in recent years, and that means that more fuel evaporates in carburetors and fuel injectors, producing more smog. A rollback to volatility levels prevalent in the 1970's should be included in the bill.

The bill also should be amended to close loopholes in many EPA-approved inspection and maintenance programs. The worst example is EPA's approval of an inspection/maintenance program in Houston, TX, that amounts to nothing more than a look under the hood.

Mr. Chairman, these measures, coupled with further reductions from stationary sources, are absolutely necessary to protect the public health and the environment. The promise to protect the health and welfare of the American people, made 16 years ago, has yet to be fulfilled. S. 2203 is a strong start toward fulfilling the promise, and the National Clean Air Coalition will work with you and the committee to improve and pass this bill.

Thank you.

Senator STAFFORD. Thank you very much, Mr. Doniger. I guess it will be a refreshing contrast. You have criticized the projected legislation as too weak, and I dare say there may be another point of view coming along a little later.

Senator Chafee.

Senator CHAFEE. Mr. Chairman, if I might, I see Mr. Kalitowski there. Could I ask a quick question of him, because I had to leave?

Senator STAFFORD. Certainly.

Senator CHAFEE. Mr. Kalitowski, in your testimony you said that Minnesota is already realizing benefits of $50 million to $75 million a year as a result of what you've done. First of all, I think it's wonderful that Minnesota went ahead alone on this because, as you pointed out, so much of it is not indigenous; it's from outside your State.

Where did you get your figure about the rewards already to Minnesota? How do you figure it?

Mr. KALITOWSKI. Senator, I should point out that our program is a phased approach and it isn't until 1990 that the caps take effect and the actual reductions, so the benefits didn't immediately take effect. But our estimates on benefits were part of a consultant's study that we had done during our process of promulgating our rule and control plan to try to estimate what the benefits were of the resources that were threatened and the projected losses as a result of acid deposition. As I promised Senator Mitchell, I would be happy to provide the committee——

Senator CHAFEE. Was this touched on already?

Mr. KALITOWSKI. Briefly.

Senator CHAFEE. Oh, I apologize.

Mr. KALITOWSKI. But I would be happy to provide you as well, Senator, with a copy of that report and the methodology used to try to quantify some of these very difficult aspects of benefits related to acid rain controls.

Senator CHAFEE. So it's in the acid rain area that your benefits came?

Mr. KALITOWSKI. That's correct, Senator.

Senator CHAFEE. I see. I didn't realize that Senator Mitchell had asked that question. And you're going to answer him by mail? Well, if you could do the same for me.

Mr. KALITOWSKI. We'd be glad to do that, Senator.

Senator CHAFEE. I'd like to address this now to Mr. Doniger.

Tell me a little bit about California. It seems to me that if California, which is a tremendous market, is doing this thing, there will be those who will be testifying up that will say, we can't meet these standards. Now, what is happening in California? Are these standards presently being levied?

Mr. DONIGER. The California standards for NO_x are more stringent than the current Federal, but these standards that are in this bill are more protective still. The fact is, though, that a substantial number of the vehicles already on the market, even without the impetus that comes from these standards' being a legal requirement, have already met one or more of them, and a number of the vehicles have actually met all of them at the same time. And these include vehicles which are at the heavy end of the scale, as well as vehicles at the light end of the scale. So it shows to us that even before these standards are made a requirement—and that has the effect of truly focusing the engineers' attention on the need to meet them—even before that, it has been shown possible to achieve these numbers by cars of any different weight, by cars that are actually on the market already.

Senator CHAFEE. For instance, you specifically, "California already limits diesel particulate to 0.08 grams per mile, a 60 percent greater reduction than the outdated Federal standard." Is that true?

Mr. DONIGER. That's true. On particulate, that's true. On particulate the California standard is way ahead of the Federal one and ahead of what is in this bill.

Senator CHAFEE. What do automobile manufacturers do about trucks? Do they make a special effort as regards California, some attachments or something, that they——

Mr. DONIGER. Well, what has ordinarily happened since 1970 and what happened most recently with the diesel particulate standard for cars is that the control devices are developed and introduced first in California, where California's requirement is more stringent than the Federal one or comes in to effect first. There are a number of cars that meet the stringent particulate standard in

California; some meet it, to my understanding, still without any tailpipe controls.

Senator CHAFEE. Is the cost greater for a vehicle in California than it is elsewhere in the Nation?

Mr. DONIGER. It might be marginally so. But these are very small increments of cost.

Senator CHAFEE. All right. Your statement also says—and I will be asking the automobile representatives about this—is that removing sulfur from diesel fuel would save each truck owner hundreds of dollars per year in maintenance expenses now devoted to fighting corrosion and wear.

Mr. DONIGER. There is an EPA study which I'd be happy to make available to the committee which estimates that for a small truck, you would get a couple of hundred—three or four hundred—dollars in net benefits. That means that once you take into account the extra penny a gallon that is the most you have to pay for the desulfurized fuel, you'd still save several hundred dollars for a small truck. And it goes on up to near $1,000 for a big truck.

Senator CHAFEE. In the life of the vehicle?

Mr. DONIGER. No, over a year.

Senator CHAFEE. That's pretty tempting.

Well, fine. Thank you very much.

Thank you, Mr. Chairman.

Senator STAFFORD. Thank you, Senator Chafee.

Senator Mitchell.

Senator MITCHELL. Thank you, Mr. Chairman.

Mr. Doniger, you have argued for sharp decreases in emissions of air pollutants, particularly those from mobile sources. Is your urging of these reductions based upon your belief that that's necessary to protect public health?

Mr. DONIGER. Yes. Both to protect the public health and to protect against the environmental effects of long-distance transported pollution. And by that I mean to include the transport of ozone as well as the transport of sulfur compounds and nitrogen compounds. The public health standards for these pollutants are not being met where tens of millions of people live, and those standards are not tight enough to protect health as it is. So, yes, these reductions are needed to protect public health, as well as the environment.

Senator MITCHELL. Therefore, may I fairly conclude that you believe that health considerations require more stringent controls than are currently in place under the existing Clean Air Act?

Mr. DONIGER. Absolutely.

Senator MITCHELL. Therefore, you would disagree with statements made by witnesses yesterday that the Clean Air Act, as it is now operating, needs no change?

Mr. DONIGER. I would disagree with that strongly.

Senator MITCHELL. All right.

Mr. DONIGER. It's partly because the EPA has demonstrated that it is unwilling or incapable, even where it has discretionary authority to tighten some of these standards, to do so. And the truck and bus standard, for example, is foremost in my mind as an absolutely clear directive to set standards that are based on what the best engines can do, and EPA set the standards based on what the worst ones can do.

Now, we may win our lawsuit and be able to move things along a little bit under the existing law, but it would be a lot simpler and a lot quicker if the Congress would do for trucks what it did for cars a long time ago, and that is to insert the proper standards right into the law.

Senator MITCHELL. On what basis do you conclude that a standard of 0.3 grams per vehicle mile of NO_x is achievable as early as 1990?

Mr. DONIGER. I said 3.0 grams, and this was for heavy-duty trucks. If you look at the record developed by EPA in setting its NO_x and particulate standards, the Agency found that the leading engines are already at or near 4 grams, and that is without incorporating an array of control devices which the advanced engines still can incorporate over the coming 4 or 5 years before we get to the 1990's.

So our estimate is that if you were to take the leading engine of yesterday and make it the leading engine of tomorrow, with the advanced controls which are available, you could get to 3.0 grams, and in conjunction with a 0.1 gram standard on particulates. The current standard is 6.0 grams for NO_x for 1988—and 5.0 for 1991, so this is much more progress than can be done under the current standard.

Senator MITCHELL. Thank you, Mr. Chairman.

Thank you, Mr. Doniger.

Senator STAFFORD. Thank you, Senator Mitchell.

Senator Burdick.

Senator BURDICK. I just have one question.

We all know that leaded gas is on the way out. Will that change the calculations that you made?

Mr. DONIGER. Well, if EPA were to fully remove lead from gasoline, then it wouldn't be necessary to do so legislatively. But the problem is that EPA's regulations don't take all the lead out of gasoline, as I understand it. And the studies, as I understand it, indicate that even the remaining amount of lead is dangerous to kids.

Senator BURDICK. If all of the lead is taken out, what's the result?

Mr. DONIGER. Well, then, you would have no longer lead going into the air from gasoline, and it wouldn't be hurting kids any more. And that's what I think the goal should be.

Senator BURDICK. Well, how would that change the degree of pollution that you referred to?

Mr. DONIGER. I think what I'm saying is, there's lead in gasoline; it's endangering kids, and the EPA is unwilling to take all of the lead out of gasoline. And that's why this bill's provision to do so is something we very much applaud.

Senator BURDICK. But my question is more of a hypothetical. If the lead was all taken out, would that relieve the problem to some degree?

Mr. DONIGER. Yes; it would mean that kids would not be absorbing lead from the air. The amount that settles on the ground and that they take up through various means would be eliminated. There just wouldn't be any more lead going into the air of an environment, and that would cut off the problem of lead poisoning in kids, and that would be a major public health plus.

Senator STAFFORD. I think what Senator Burdick wants to know is, would that change the other elements of air pollution and your——

Mr. DONIGER. I think the lead problem is more or less independent of each of the other ones that are mentioned here. But lead in gasoline, when it goes into a car with a catalytic convertor, destroys the converter, throws away the investment in that equipment that we've made, and results in greater pollution coming out from each car which has a deactivated converter. So another one of the benefits of getting the remaining lead out of the fuel supply would be that people would not be able to make the mistake of putting leaded fuel into an unleaded car.

Senator BURDICK. You're still missing the point that I'm trying to make. If we got rid of all lead, got rid of it right now, would that have a salutary effect on the environment?

Mr. DONIGER. Yes, it would help the health of kids very much.

Senator BURDICK. Besides that?

Mr. DONIGER. I think the major bad thing that lead in gasoline does is hurt people's health. It is not, itself, a major environmental problem, to my knowledge; it is mainly a public health problem.

Senator BURDICK. That wouldn't solve all the problem, then, just removing the lead?

Mr. DONIGER. Oh, no. There's all five other vehicular pollutants I have mentioned, each of which has its own health and environmental damages that it does, and each must be dealt with.

Senator BURDICK. Thank you.

Senator STAFFORD. Thank you, Senator Burdick.

Senator Baucus.

Senator BAUCUS. Thank you, Mr. Chairman.

Mr. Doniger, you said that 25 percent of the present auto fleet could meet the standards, the NO_x, CO, and hydrocarbon standards, set out in S. 2203; is that right?

Mr. DONIGER. Yes; these numbers represent numbers that 1986 cars were certified to meet. Now, there will be some testimony, I expect, that suggests that meeting these numbers in combination is a little bit more difficult than meeting them one by one. But my point is that this is a result which has occurred in a quarter of the fleet without anybody really trying, without any mandated effort to meet levels that low. And the automobile industry has proven that when it finally believes that the limits set in law can't be evaded and can't be postponed, it can meet the targets that the Congress sets. And we believe that if Congress sets the emission limits which are in this bill for cars, they will prove to be attainable by all cars.

Senator BAUCUS. What are some of the new technologies that can help industry meet the standards in the bill?

Mr. DONIGER. Well, major advances have been made in the last few years in several areas. One, as I understand it, is in the technology of the catalyst itself. The catalysts of today are just a lot better than the catalysts of 4 or 5 years ago or 10 years ago, and they are much more efficient at reducing pollution than the ones that were used just a short time ago.

The second area is fuel injectors. There are techniques called "multi-point fuel injection" which more precisely meter the fuel that goes into the cylinder and gets the most performance you can out of it with the most effective burning and least pollution.

The thing that makes it possible to control all that so precisely is that cars used to have mechanical parts to control how much fuel went in and what the air/fuel ratio was, and so forth. Now they have electronic computers, and the programs in these computers are getting better and better, as the engineers work on them, at being able to control the fuel and air and various other parameters so that you get, as I said, the most driving energy out of the fuel with the least of it wasted in the form of unburned fuel or pollution.

Senator BAUCUS. Thank you.

Thank you, Mr. Chairman.

Senator STAFFORD. Thank you, Senator Baucus.

I had just one question that occurred to me, Mr. Doniger, as we went along, and that was your comment about converting city buses and other large centrally-fueled fleets to methanol. Is methanol a form of alcohol?

Mr. DONIGER. Yes, it is. It can be made, as I understand it, from various different types of sources. I think it can come from anything ranging from grains to coal. If I might mention, NRDC settled an enforcement lawsuit against General Motors this June with a program to place methanol-powered buses in New York City as a demonstration of the capabilities of these buses. And within a year, we should see the first buses in this program go into New York. California has some, too. It's a feasible technique, a feasible technology, and we hope that soon bus riders—and bus followers, which is maybe even more important—we'll see that these buses don't produce smoke and are much cleaner.

Senator STAFFORD. Is methanol a more expensive fuel than diesel?

Mr. DONIGER. Currently, it is. This program that we have got in New York has some kind of a methanol price guarantee from the Celanese Corp., which is the fuel supplier. But I think that the price may well change so that it becomes competitive. Oil and oil-based fuels are not going to stay as cheap as they are now, and methanol will be competitive with them.

Senator STAFFORD. Thank you very much.

Mr. DONIGER. Thank you.

Senator STAFFORD. Senator Burdick has one more question.

Senator BURDICK. This experiment that you're carrying on, is that pure methanol or is it a mix with gasoline?

Mr. DONIGER. It's methanol, which is different from ethanol, and it is nearly pure. It's still to be decided whether it's going to be 95 percent methanol or 100 percent. It's not mixed with gasoline.

Senator BURDICK. It's not a mix, then?

Mr. DONIGER. No; it's essentially pure methanol.

Senator STAFFORD. Thank you very much.

Mr. DONIGER. Thank you.

Senator STAFFORD. Now we're going to our first panel, which will consist of Mr. Roger Stapf, Ms. Paula Gustafson, Mr. James McCandless, and Mr. C.K. Salter. We're going to ask the panel members if they would confine their remarks to 5 minutes. Where we have written statements, they'll be placed in the record, unfortunately we're running out of time.

I apologize if I've mispronounced anybody's name.

Mr. Stapf, you might be the first witness; and you're the chief engineer, small engines, Caterpillar, Peoria, IL. So we welcome you here.

STATEMENT OF ROGER A. STAPF, CHIEF ENGINEER, ENGINE DIVISION ENGINEERING, CATERPILLAR INC.

Mr. STAPF. Yes, Mr. Chairman. I am Roger Stapf, chief engineer of engine division engineering for Caterpillar, Inc., a major manufacturer of earthmoving and materials handling equipment and heavy-duty diesel engines used in both on-highway and off-highway equipment. We appreciate this opportunity to comment. The heavy-duty panel members have condensed their testimony to avoid duplication; however, we would ask that our remarks be entered in full in the record.

Senator STAFFORD. They will.

Mr. STAPF. The extension of the heavy-duty truck emission standards to nonvehiclular applications is of particular concern to Caterpillar. We believe the regulation of engines used in off-highway machinery is unnecessary and should be deleted from S. 2203.

A review of the scientific data indicates little, if any, impact on air quality from off-highway equipment. A California study, completed in 1982, of farm, construction, and industrial equipment concluded that their emissions' contributions were insignificant. The attached pie chart, illustrating 1983 EPA data, shows a contribution to acid rain in the northeast of slightly more than 1 percent, and a 1984 Office of Technology Assessment report concluded that the extent to which hydrocarbons and oxides of nitrogen from all mobile sources contributed to acid rain was uncertain.

Aside from the question of environmental need to control off-highway vehicle emissions, there is the matter of technological feasibility.

There appears to be an assumption that engines used in off-highway machinery are similar or identical to on-highway truck engines. This simply isn't true. There is a wide range of diesel engines varying in displacement, number of cylinders, methods of aspiration, horsepower, RPM, and torque. For example, Caterpillar's product line includes over 100 models of construction machinery using 22 different engine models in the 60 to 1,600 horsepower range. Only 4 of these 22 engine models even resemble truck engines.

Engines in construction machines operate differently from truck engines. They are required to simultaneously move the machine while providing power for a variety of tasks such as digging, lifting, pushing, and pulling at varying speeds and in varying terrain. Compare this to a truck engine solely responsible for powering a rig over the highway.

In addition to the questionable ability to transfer truck emissions control technology is the lack of a suitable test to determine off-highway engine emission compliance. The current transient test, specifically developed for on-highway truck engines, does not apply to construction machinery engines. New tests and new facilities and equipment would be required.

Imposing a costly emissions control program would severely strain an industry already weakened by years of economic slowdown without providing any significant impact on controlling acid rain.

Mr. Chairman, turning now to the on-highway diesel engine provisions of the legislation, the emission standards proposed in S. 2203 are far more stringent than those adopted by EPA. The hydrocarbon and carbon monoxide levels represent 58- and 89-percent reductions from the already-achieved levels mandated by the Clean Air Act. Requiring these levels of reduction ignores the tradeoffs inherent in engine technology, that reducing one pollutant jeopardizes the ability to control another. These tradeoffs are acknowledged by the EPA in its recent rulemaking and recognized by this committee in 1981 when it endorsed simultaneous standards-setting for NO_x and particulates.

When S. 2203 was introduced, supporters of the bill indicated that it would require emission levels attainable today using existing technology. However, the questionable methodology used to determine these standards ignores the fact that any single engine at the 25th percentile for one pollutant is not necessarily at or below the 25th percentile for another. In fact, none of the 58 engines surveyed is capable of meeting all four pollutant standards simultaneously.

Mr. Chairman, we do agree on one issue. We believe it is essential that the sulfur content in diesel fuel be reduced to a level of 0.05 percent by 1990 to enable engine manufacturers to comply with 1991 emission standards. Low sulfur fuel would reduce particulates and SO_2 emissions from existing engines, enable a wider variety of particulate trap technology, and improve engine durability. We believe this should be done within the rulemaking process, and Caterpillar continues to discuss with EPA the critical importance of commercially available low sulfur fuel by 1990.

In summary, we believe the existing authority of the Clean Air Act does provide the necessary framework to regulate heavy-duty diesel engines. The current EPA regulatory program—imposing strict emission levels on trucks through the mid-1990's—is a technology-forcing and costly program severely challenging heavy-duty engine manufacturers.

Senator STAFFORD. Thank you, Mr. Stapf.

And now we'll hear from Paula Gustafson, Cummins Engine Co., Columbus, IN.

STATEMENT OF PAULA GUSTAFSON, CUMMINS ENGINE CO.

Ms. GUSTAFSON. Thank you, Mr. Chairman. I'm glad we've only been allowed 5 minutes today; my contractions are about 5 minutes apart right now, so I'll be able to time this perfectly.

My name is Paula Gustafson. I am the product environmental management director of Cummins Engine Co. We thank you for the opportunity to appear before your committee to summarize our major concerns with the acid rain bills.

Cummins Engine Co., Inc., headquartered in Columbus, IN, is one of the leading worldwide manufacturers of diesel engines. We supply engines and components for heavy-duty trucks, construction, marine, industrial, and defense markets.

In my written testimony I focused on three issues with respect to bills S. 2200 and S. 2203 as they apply to heavy-duty engines. These issues were the proposed emission standards and the standard-setting process; sulfur content of diesel fuel; and, three, the 10-percent acceptable quality level. In the oral testimony, I'll be focusing primarily on the standard-setting process.

Specific standards for heavy-duty engines or vehicles should not be included in the Clean Air Act. In the 1977 Clean Air Act Amendments, Congress established a framework or process for setting emission standards for heavy-duty engines or vehicles. Congress set forth this process in sections 202(a)(3) (A) through (E).

This process, one, establishes a repetitive, periodic mechanism for setting and modifying heavy-duty standards. The 4-year leadtime requirement reflects recognition of the technology and product development cycles in the industry.

Two, it establishes percent reduction target standards as a starting point for regulation, but authorizes and encourages EPA to establish underlying target standards based solely on health and welfare criteria.

Three, it permits EPA to establish temporary standards, or revised standards, that are less stringent than the underlying target standards because of technological infeasibility, excessive cost, or undesirable tradeoffs among pollutants or tradeoffs with other national objectives.

And four, it directs EPA to gather, evaluate, and incorporate into this process new evidence relevant to standard setting. Using this information, EPA may permanently change the underlying target standards, making them more or less stringent, and may further revise the temporary standards.

S. 2203 would change this framework by writing into the statute specific and rigid standards reflecting concerns about the possible adverse effects of acid deposition. The current law allows EPA to take full account in the standard-setting process of evidence on possible health and welfare threats posed by acid deposition, as well as by other pollutants, and yet retain the flexibility to modify standards in the future to reflect new evidence on these and other threats without waiting for Congress to act.

Under the standard-setting process, every 3 years EPA is required to report the results of an ongoing pollutant-specific health effects study and, based on this and other information, it may change the underlying target standards. In accordance with this process, Congress might direct EPA to consider the health and welfare evidence on hydrocarbons, carbon monoxide, and other pollutants of concern, and to make a determination—with a report to Congress—whether the evidence warrants standards different from those currently promulgated for 1991 and, if so, whether they would be technologically feasible without increasing cost or decreasing fuel economy to an excessive and unreasonable degree.

I'd like to summarize for the record our position on fuel sulfur. We believe specific levels for the sulfur content of diesel fuel should not be included in the Clean Air Act. While we support the reduction in sulfur content of diesel fuel, we do not agree that this should be done by setting the standard in the Clean Air Act.

We urge that the committee direct EPA to institute a rulemaking to set a fuel sulfur standard pursuant to the authority and criteria in section 211, effective not later than January 1, 1990.

And for a final point, we believe a specific acceptable quality level should not be included in the Clean Air Act.

This completes my testimony, and I'd be happy to answer any questions.

Senator **Stafford**. Thank you very much, Ms. Gustafson. If it eases your mind, the Capitol physician has a good staff and excellent facilities.

Ms. **Gustafson**. Good.

Senator **Chafee**. Although I'm not sure he's an expert in what Ms. Gustafson might require.

The guys sitting on either side of you look kind of nervous.

Senator **Stafford**. Mr. McCandless, you're a vice president for engineering at Navistar International. That used to be International Harvester, didn't it?

Mr. **McCandless**. That's correct, Senator.

Senator **Stafford**. We'd be glad to hear from you.

STATEMENT OF JAMES C. McCANDLESS, VICE PRESIDENT, ENGINE ENGINEERING, NAVISTAR INTERNATIONAL CORP., MELROSE PARK, IL

Mr. **McCandless**. Mr. Chairman, members of the committee, again, my name is Jim McCandless. I am vice president of engine engineering of Navistar International Corp. I appreciate the opportunity to present Navistar's comments on the provisions of S. 2200 and S. 2203 as they affect heavy-duty emissions. I would like formally to request that the position statement of the Engine Manufacturer's Association be incorporated in the written record today.

Navistar is the leading manufacturer of medium- and heavy-duty trucks in North America, as well as a major producer of medium-duty and light-heavy-duty diesel engines. Our mid-range diesel engines are used in our own medium- and heavy-duty trucks; our 6.9-liter light-heavy-duty engine is used in Ford's heavy-duty pickup trucks and vans, as well as in our own mid-range pickups.

As a member of both the Engine Manufacturers Association and the Motor Vehicle Manufacturers Association, Navistar fully supports their position that the heavy-duty mobile source provisions in S. 2203 and S. 2200 should be dropped. These provisions are unnecessary because the of heavy-duty engines to the acid rain problem is extremely small, and because the Environmental Protection Agency has used its existing statutory authority to push the heavy-duty engine industry up to—and possibly beyond—its technological limits.

The emission standards already promulgated by EPA represent the lowest levels that can be achieved by our industry. EPA established these levels based upon a thorough review of the level of existing technology and by holding public hearings. We believe that the current practice of setting percentage reduction targets and then allowing EPA the flexibility to revise and adjust them based upon technological considerations has worked well in the past and should be continued. Heavy-duty emissions are being reduced as fast as the development of the technology will allow.

Navistar is particularly concerned about the impact of a further tightening of these standards on the light-heavy-duty end of the diesel engine business. Navistar has been a leader in providing new engine products in this segment of the market, which has grown considerably in recent years. Truck purchasers have increasingly turned from gasoline engines to diesels to obtain better fuel economy. They have also turned to diesels to lower maintenance costs and improve durability. While the initial purchase price of a diesel is higher, the payback in most applications has, until recently, been relatively short.

However, the 1991 NO_x and particulate standards will challenge our ingenuity. Because the smaller, lighter diesel engines compete directly with gasoline engines, what we do to these engines to reduce emissions must not carry a durability, maintenance, or fuel economy penalty, nor can it impair the overall performance or significantly increase the price of the engine, especially in this time of reduced gasoline prices. If fuel economy is degraded and engine prices are increased, truck buyers will opt for lower-cost—but much less fuel-efficient—gasoline engines.

Because of these competitive restraints, we at Navistar will try to meet the 1991 standards by reducing emissions through engine modifications rather than relying on costly and unproven trap oxidizer technology. But light-heavy-duty diesels, such as our 6.9, will require a lot more redesign than heavier-duty engines.

To be more specific, we will have to totally redesign the 6.9 for direct injection rather than its current indirect injection system, and convert it to a mechanically-actuated injection system. We will also have to turbocharge this engine. All of this will force us to retool the engine, head, and crankcase at an estimated capital cost exceeding $60 million.

Senator, $60 million is more than Navistar's projected fiscal 1986 total profitability. The product cost of this engine is also expected to increase at least 20 percent.

Larger diesel engines already use direct injection and turbocharging and, therefore, will require a much lower capital investment and will experience a much lesser product cost increase.

Even if we spend all this money, we are not absolutely sure we will meet the 1991 standards for NO_x and particulates. But the task will be more feasible if EPA moves to reduce the sulfur content of diesel fuel. For this reason, Navistar recommends that this committee, in writing its report, encourage EPA to follow through with its announced plans to set lower sulfur content standards for diesel fuel.

You may ask, how can Congress ensure that heavy-duty engine emissions are being reduced as fast as possible? There are two things that we see that this committee could do that would help.

First, section 202(a)(3)(D) of the Clean Air Act requires EPA to submit reports every 3 years on the status of emission control technology and the impact of emission controls on public health, cost-effectiveness, and fuel economy. These reports would greatly increase your ability to exercise wise oversight and to judge for yourself whether EPA is truly doing its job. To date, EPA has not submitted these reports and Congress has not demanded them.

Second, section 202(a)(3)(C) of the Clean Air Act also calls for reports by the National Academy of Sciences on the feasibility and cost of achieving heavy-duty emission reductions. One such study was done on NO_x in 1981 which was very helpful to EPA and to our industry. Navistar believes that additional NAS reports would be useful to Congress, to EPA, and to the engine industry. They would provide a knowledgeable third-party opinion about EPA's efforts to force the development and use of technology. Again, this committee can play a role by requiring further NAS reports to be made.

In conclusion, I would like to say that we at Navistar share your concern that the quality of the Nation's air must be improved to the greatest possible extent. If I leave any impression with you today, I hope it is the impression that we are working as diligently as possible to achieve this goal, and we will continue to do so in the future.

Thank you.

Senator STAFFORD. Thank you, Mr. McCandless.

And finally, Mr. Salter, engineering development manager of Mack Trucks in Hagerstown. We'd be happy to hear from you.

STATEMENT OF C.K. SALTER, ENGINEERING DEVELOPMENT MANAGER, MACK TRUCKS

Mr. SALTER. Thank you, Mr. Chairman, Senators. I am Charles Salter, chief engineer of engine development at Mack.

Some of the provisions of the bills to amend the Clean Air Act will have profound impact on Mack, and we wish to comment on the mobile source issues in these bills that directly affect our heavy-duty diesel engine product, which are utilized in Mack's heavy-duty trucks.

The proposed diesel standards in S. 2203, namely, the 0.54 HC, the 1.75 gram CO, as well as the NO_x and particulates, taken together, are technologically infeasible for Mack to achieve. It is anticipated that some manufacturers may be forced out of the diesel truck engine business if these standards are adopted.

Furthermore, we are surprised at the methodology utilized in deriving this set of standards because we believe it did not follow good engineering judgment, as explained in our written statement. The approach adopted is like asking a pentathlon champion to compete and win against the champions of each of the five athletic events. The methodology ignores the fundamental technical realities inherent in attempting to simultaneously reduce all pollutants. For example, reducing NO_x increases HC and particulates and increases fuel consumption.

As you know, over the years engine manufacturers have developed some knowledge on reducing pollutants such as NO_x and HC, and to a certain extent particulates, even within the constraints of the control tradeoffs noted earlier. However, we have not found any engine-related parameters that could reduce CO emission in diesel exhaust to the level which represents a 99 percent reduction from unregulated engines, and as proposed in S. 2203. Our recommendation is that Congress should not set numeric emission standards, but rather give guidance to EPA, which is better staffed and equipped to properly evaluate the technological conflicts and tradeoffs that occur when any pollutant standard is reduced.

Most of the emission control rules and standards are inextricably interwoven, as noted earlier. The concept of acceptable quality level is no exception. The AQL has a direct effect on achieving the emission standards themselves; in fact, increasing the stringency of the AQL has the same effect as increasing the stringency of the emission standards.

This parallel is clearly illustrated in the figure attached to the written statement. It can be observed that, in order to meet a standard of 0.54 grams HC with the current 40 percent AQL, Mack must develop its engines to a lower 0.51 gram low mileage target value. However, with a 10 percent AQL, the low mileage target must be reduced even further to assure that an additional portion of engines also pass the SEA. Therefore the result of a 10 percent AQL is a further 19 percent reduction in hydrocarbons in addition to S. 2203's proposed reduction of 58 percent from the currently-promulgated regulation, which itself represents a 90 percent reduction from unregulated engines.

Obviously, the introduction of a 10 percent AQL will not provide something for nothing. Its imposition will be at the expense of higher fuel consumption, in the case of NOx; poorer vehicle driveability, in the case of particulates; and possible elimination of product line in the case of HC or CO.

Furthermore, after first proposing a 10 percent AQL, EPA themselves rejected the concept and finally promulgated the 40 percent AQL instead. Mack recommends retention of a 40 percent AQL.

Mack favors the reduction of sulfur content from No. 2 diesel fuel for the following reasons.

First, low sulfur fuel will increase the useful life of particulate traps which today are needed to meet the stringent 1991 and 1994 particulate standards already promulgated by EPA.

Low sulfur fuel will allow the use of noble metal catalysts, which would reduce the ignition temperature of the particulate accumulated in the trap. This should significantly aid the development of the particulate trap regeneration control systems which are absolutely imperative to the successful use of traps and which today are the obstacle to that successful use.

Further, we acknowledge that the low sulfur fuel content will tend to improve engine durability.

So, we recommend that EPA be required to implement a reduced fuel sulfur standard with lead time sufficient for universal availability by January 1, 1991, when heavy-duty diesel engine particulate traps will be required.

In summary, Mack believes that the 1977 amendments to the Clean Air Act effectively deal with the heavy-duty diesel emission problem. We believe there are no reasons for significant further mobile source amendments.

And specifically, Congress should not introduce numeric emission standards into the act. The AQL figure should not be altered from the 40 percent as currently promulgated, and EPA should be required to promulgate a cost-effective diesel fuel sulfur reduction.

I'd be happy to answer any questions.

Senator STAFFORD. Mr. Salter, does Mack Trucks make their own diesel engines?

Mr. SALTER. Yes, we do. Our engines are captively used by Mack Trucks as a truck builder. We do not sell our engines to other vehicle manufacturers.

Senator STAFFORD. Could I ask you, how long is the time that diesel engines can be expected to operate under normal conditions before a major overhaul is necessary?

Mr. SALTER. That varies tremendously depending on the duty cycle of the engine. In highway fleets, it's not untypical to get 300,000 miles or in excess of that before the first overhaul.

Senator STAFFORD. Are the engines then capable of being measured and going into another long period of service?

Mr. SALTER. To return to line haul service?

Senator STAFFORD. Yes. After a major overhaul.

Mr. SALTER. Yes. Very often, they are returned to line haul service after a major overhaul.

Senator STAFFORD. Might I ask all the panel, is that true generally of the heavier diesels that you manufacture?

Ms. GUSTAFSON. Yes.

Mr. MCCANDLESS. Yes.

Senator STAFFORD. Whether they are marine applications or highway or off-highway use?

Mr. STAPF. Yes.

Senator STAFFORD. All right. Thank you. We are pressed for time, so I will put any other questions I may have in writing, if that would be agreeable, and ask for your response in writing.

Senator Chafee?

Senator CHAFEE. I'll keep my questions short.

Gentlemen, and Ms. Gustafson, you all agreed on reducing the sulfur content of the diesel fuel. Let me see if I understand what you're saying. You want EPA to get on with implementing the reduced fuel sulfur standards so that an adequate supply of this new type of diesel fuel will be available. Is that correct?

Ms. GUSTAFSON. Yes.

Mr. MCCANDLESS. Correct.

Senator CHAFEE. And absent that, the fuel isn't liable to be there?

Ms. GUSTAFSON. Correct.

Senator CHAFEE. And that you agree with Mr. Doniger's statement when he said that removing sulfur from diesel fuel results in substantial savings to each truck owner in maintenance expenses now devoted to combating corrosion or wear. Is that right?

Mr. STAPF. I might comment on that. We know that if you increase the amount of sulfur from existing levels—three-tenths of a percent is commonplace today—to 1 percent it would have a serious effect on engine durability. There is precious little data, though, going from three-tenths down to 0.05, and the law of diminishing returns will probably apply. But there will be some durability benefit.

Senator CHAFEE. Well, why do each of you endorse it?

Mr. McCandless. For emissions reasons. It reduces particulate emissions.

Senator Chafee. But you don't see the savings there for wear and tear on the engine?

Mr. McCandless. Not significant.

Mr. Salter. Not significant.

Ms. Gustafson. I think it also gives us a little more flexibility in terms of technology that we can use to control emissions.

Senator Chafee. I'd briefly like to ask you about the Japanese competition.

What would be the effect of this legislation on your competitive position? Obviously, Caterpillar once upon a time was one of our great exporting companies. What would be the effect on that competitive position if you had to meet some of these requirements? You say you can't meet them all, but suppose we put the squeeze on you to meet some of them?

Mr. Stapf. Mr. Chafee, I think maybe we could answer that in a couple of chapters—first pertaining to construction equipment. As we said, we make over 100 models. Many of them are produced in very low volumes. Our principal competition is Komatsu. This would give them an advantage in overseas business because Caterpillar would be forced to either split our models into United States and export versions, or have common models and pay a penalty in fuel consumption and performance.

Senator Chafee. Well, this is an impressive array of witnesses. Thank you, Mr. Chairman.

Senator Stafford. Thank you, Senator Chafee.

Is General Motors also a competitor in the diesel field?

Ms. Gustafson. Yes, they are.

Senator Stafford. They have a spokesman later on, but I would assume that he'll comment on that.

Senator Mitchell?

Senator Mitchell. Thank you, Mr. Chairman.

With one minor exception, the testimony of this panel has been to the effect that further controls would be difficult to achieve and should not be required.

Each time the Clean Air Act has been considered by the Congress, motor vehicle manufacturers have come before the Congress and have said the same thing: further reductions cannot be achieved. Each time, the Congress has rejected those claims and mandated further reductions. Emissions controls are then put into place, and significant reductions then have been achieved.

I'd like to ask each of you to tell me what is different this time.

Mr. Stapf. We're reaching a law of diminishing returns. The initial on-highway truck standards were established 12 to 16 years ago. There has been a succession of about five reductions in pollutant levels in that duration. As each step occurs, the degree of difficulty of reaching the next level compounds itself. We find ourselves in that position, for instance, regarding NO_x and particulates where, retarded timing to reduce NO_x raises particulates. So we have to search for technologies which enable positive trade-offs with as many as four different pollutants while maintaining a customer's perception of value in other areas like performance, reliability, and durability. People buy our machines to earn their livings.

Ms. **Gustafson**. We are facing more stringent standards in 1991, which right now I don't believe we know how to achieve. The point that we are trying to make is that you can't look at this as a one-dimensional problem by just writing in standards in the Clean Air Act. We think the standard-setting process as it is set up today will allow us to look at all the other issues associated with it, the technological feasibility and the cost, and not just the health and welfare aspects, although they are important. And I think that's the point that we were trying to make.

Mr. **McCandless**. I guess I agree with both previous discussions. In the past, I think, when we've had emission levels promulgated, we've had some demonstrated technology ahead of that that said it could be done. Today we're facing an emission law in 1991 of 0.25 grams particulates and very low NO_x, 5 grams, which has, to my knowledge, never even been demonstrated. We don't know what the technology is.

At Navistar we have some technology that shows us that we can move toward that standard, but we have no assurance that we are going to actually meet that standard. And to talk about even lower standards before we are able to meet the 1991 standards is just too much for us to handle. We are working as hard as we can.

Mr. **Salter**. Diesel engines and emission controls—we could probably draw an analogy to a balloon where you squeeze one part of the balloon to make it smaller, and it pops out somewhere else. And that, in fact, is the case. When I try to reduce NO_x, particulates increase and hydrocarbons increase. Not the least to also increase is fuel consumption.

Mack, in our best research today as we've reported to EPA just this week, we've not been able to achieve their 1991 standards which, for NO_x and particulates, are essentially the same as in S. 2203. Our best research today has not shown those as feasible, yet we continue to work in that regard. But we can't give any assurance that we can achieve even those standards, and now S. 2203 lumps on top of those already technologically questionable standards further reductions in HC and CO, which compounds the whole control scenario.

Senator **Mitchell**. But of course, you've all sat here this morning and have heard testimony to the effect that health concerns are stronger than ever, and that we face a serious problem in terms of protecting the public health. You obviously are all concerned about that; you're citizens, members of families like everybody else. So what would we say to the argument that, even if one accepts the contentions you've made and against the background of prior industry positions—it would be difficult to accept that, but even if one did—in view of the serious health concerns, even if it is more difficult and more costly, should we not make the effort?

Mr. **Stapf**. We certainly are all members of the same human race, and we cannot argue with the basics of improving our clean air. It's the highest priority in our hierarchy of needs. However, I think all of our testimony keyed on the basic point of, how far and how fast? Being faced with required inventions is an awesome job.

To do it in a very short period of time makes your odds of achieving it very risky. We're pedaling about as fast as we can right now.

Senator MITCHELL. Would anybody else care to comment?

Mr. McCANDLESS. I would agree with that. We're going as fast as we can.

Mr. SALTER. I think it's significant that the four major emittants from a diesel are being asked to be simultaneously reduced. I guess I wonder, from the health protection perspective, whether there are the same stringent requirements for each of those four pollutants, and would suggest that perhaps the priorities could be readdressed so that there may be an ability, from a regulation standpoint, to not reduce some of those four as strictly and stringently as some others. Base those priorities on the balloon problem that I tried to explain, to illustrate the interwoven effect of controlling all four emittants. This would be offered as a suggestion. What do we really need? Some previous witnesses have suggested that ozone is the bad stuff—which relates to HC emissions—and that SO_2 is the bad stuff. Perhaps, then, NO_x is not quite so much the bad stuff, and some of the other pollutants.

Where do we strike a balance in all of this? We can't get everything simultaneously, I think, is what we're saying.

Senator MITCHELL. Thank you all very much.

Senator STAFFORD. Thank you, Senator Mitchell.

Senator Baucus.

Senator BAUCUS. Mr. Salter, what would your priorities be?

Mr. SALTER. I beg your pardon?

Senator BAUCUS. What would your priority be among those four?

Mr. SALTER. Well, I'll answer that from probably not as educated a point of view as I would expect that EPA could. My position at Mack is to find technologies to reduce the emittants and spend less time on deciding which of those really are the most crucial to public health. However, from the points of view that I've heard expressed, it seems that ozone, because of its widespread unattainability—and perhaps, only at this point, particulates—is one of the emerging concerns, even though the particulate issue has not been shown from any viable scientific study as really being a significant health effect. We accept that it could be a detrimental health effect, but the scientific evidence is certainly not overwhelming.

Senator BAUCUS. I'd like to ask each of you what are the most promising technologies that will help you to meet these standards if, in fact, this legislation passes. Mr. Doniger earlier talked about—at least for cars; I don't know the degree to which it applies to heavy-duty vehicles—about multijet fuel injection; he talked about computers; he talked about improvements in catalytic converters. What are some of the potential technologies that look the most promising?

Mr. STAPF. I can kick it off, if you like.

First of all, our strategy is related to being sociable, and that means meeting the requirements of society. The building blocks that we have chosen to concentrate on in our heavy-duty diesel engines have been evolving for a period of time. Now we're up to a point where the naturally aspirated diesel will likely be legislated out in the 1988 timeframe, replaced by turbocharged models operating at higher cylinder pressures with high rates of fuel injection to control the combustion and, in some cases, electronic engine controls. But these basic building blocks still leave us short of a known way to achieve the 1991 standards, which hinges on particulate trap technology developing at the same time.

Our keen interest in sulfur removal relates to the—1991 particulate standard of 0.25 grams. Sulfates and attached water which is collected on a measuring device, accounts for 20 to 25 percent of the standard. And we can't ignore this 25-percent reduction in the total regulation on disregard production margins that are necessary to ensure compliance.

So they're some of the key building blocks we're using and the reasons for our emphasis today.

Ms. GUSTAFSON. I guess I would agree with the comments that Roger made. I would say that the emphasis for the heavy- duty industry is that they are just now going into the era of electronics and electronic controls, and I think that is the one technology that we will be focusing on to try to reach the lower levels in the future.

Particulate traps are being worked on as fast as we can with just as much technology as we know how to apply; but as Roger pointed out, the issue of sulfur can slow that progress down because of some of the problems you have in developing particulate traps with sulfur in the fuel.

Mr. MCCANDLESS. I guess Navistar's key technologies for the 1990's is, first, we see that all on-highway diesel engines in the 1990's will have electronically controlled fuel injection equipment.

We are developing new and novel high-pressure fuel injection systems to control NO_x and particulates. We will utilize advanced turbocharging with electronically controlled variable geometry, possibly, and most engines will use advanced air-to-air intercooling to further reduce NO_x. We're working on particulate traps very, very hard; however, right now we don't believe the technology will be in place to produce a commercially feasible trap by 1991.

Lowering the sulfur standard automatically reduces our particulate emissions by 15 to 20 percent. We need that to even be able to approach the 0.25-standard. It also helps in the development of the traps, as has been said previously.

Thank you.

Senator BAUCUS. Mr. Salter.

Mr. SALTER. Early in the decade, the National Academy of Sciences addressed themselves to the technologically feasible emission standards for diesel truck engines. I don't have that report available to be able to quote to you the values of the emittants that they thought were technologically feasible; however, also in that report they too identified the technologies for diesel emissions reductions. Amongst those were the use of turbochargers, the use of charged air cooling, which—in 1988 all Mack engines will be equipped with that technology.

We, too, are working simultaneously to develop particulate traps, but don't see those yet as feasible for 1991. And so we are simultaneously, then, developing—apparently much like Navistar—higher pressure fuel injection systems, combined with electronic controls that we have not yet evaluated with the hopes, at this point, that they will provide some further reduction in particulates.

So that, in conjunction with what seems to us as an automatic aid by removing sulfur from the fuel, are the technologies that we feel will get us to the EPA 1991 standards.

Senator BAUCUS. Thank you very much.

Thank you, Mr. Chairman.

Senator STAFFORD. Thank you.

Senator CHAFEE. Mr. Chairman, could I ask one quick question?

Senator STAFFORD. Certainly.

Senator CHAFEE. First of all, I think that you all are stressing the need to get on with the lower sulfur content that was at issue before. I'm particularly concerned about your competitive position, and I brought that up once before, particularly as it involves Komatsu.

Now, let me ask you this. Is the United States such a large market for Komatsu—regrettably—that whatever we do here, require here, Komatsu would automatically also do in order that they could sell their engines here? Or would they set up two lines? What would they do? Obviously you don't work for Komatsu, but what do you think they'd do? Mr. Stapf.

Mr. STAPF. Komatsu has established a small assembly operation in Tennessee, as I understand it, so they do have a presence in the United States But by and large, the bulk of their machinery is manufactured in Japan.

Senator CHAFEE. That's not the real answer to my question. It may be manufactured in Japan, but because of the size of the United States market—and I don't know; they must sell a lot of machines here, unfortunately, but they do—would that cause them to build their engines in Japan to meet the United States standards, or would they have a double line, one to meet United States standards and one to meet the rest of the world?

Mr. STAPF. We'd likely be faced with the same obstacles, yes. I think they would have to make a decision based on their business, whether it would be viable to make two or have a U.S. model. It would probably end up very much like the California situation of today. But there's still an incentive to make one regulation for the 50 States.

Senator CHAFEE. Thank you, Mr. Chairman.

Senator STAFFORD. Thank you, Senator Chafee.

Mr. Stapf, Senator Chafee alluded to an earlier time in Caterpillar operations. I recall that Alexander Botts was the most famous salesman that you had for many years. He died with the Saturday Evening Post, though, I think.

Mr. STAPF. Well, it's a great tradition.

Senator STAFFORD. Well, I thank you all on behalf of the committee for joining us and counseling with us on this difficult problem.

The next and final panel will be Mr. Thomas Hanna, president of the Motor Vehicle Manufacturers Association; Mr. Donald Buist, director of the automotive emissions and fuel economy office for the Ford Motor Co.; Mr. Howard Padgham, chief engineer of powertrain engineering programs for Chrysler; Dr. Richard Klimisch, executive director of the environmental activities staff, General Motors Corp.; Dietmar Haenchen, executive engineer, vehicle regulations department, Volkswagen of America; and Mr. Gregory Dana, technical director, Automobile Importers of America.

Gentlemen, my apologies in advance if I have mispronounced your names, and we would propose to go through the panel as I have called your names. And we would ask you in the interests of time to confine your verbal remarks here to 5 minutes. Where we have statements, we will place them in the record in full; and if you have not supplied us with a statement but have one, we will place it in the record in full.

So with that preliminary, Mr. Hanna, you're on.

STATEMENT OF THOMAS H. HANNA, PRESIDENT AND CHIEF EXECUTIVE OFFICER, MOTOR VEHICLE MANUFACTURERS ASSOCIATION

Mr. **Hanna**. Thank you, Mr. Chairman and members of the committee. We have a panel of representatives of our industry here, as you have indicated, and they will be prepared to make remarks in their sequence.

In the interests of the committee's time I shall briefly summarize our views and accept your permission to put our statements into the record in a more detailed form.

Since the previous panel addressed the heavy-duty truck aspects of S. 2203, my remarks will be directed primarily to light-duty vehicles. This, however, does not imply any lesser concern on our part with regard to the heavy-duty provisions of the bill.

There are three major questions that I would like to focus on. The first is the contribution of motor vehicle emissions to acid deposition; the second is the feasibility of the new exhaust emission standards proposed by S. 2203; and third, the benefits—if any—that such standards might produce.

Let me begin by addressing the last point, the potential benefit question. We have a chart to illustrate our point here, as you can see, which shows the substantial progress that has been made in reducing automobile emissions, more than 90 percent overall from uncontrolled levels. Because the present levels are so low, the incremental air quality benefits that could be achieved by further tightening would be minimal. But while the incremental air quality benefits would be small, the task that S. 2203 would impose on manufacturers is enormous, requiring a further reduction of 60 to 75 percent of emissions from today's low levels for both passenger cars and light trucks.

Turning to the question of acid deposition, especially in the Northeastern United States, sulfur oxides are considered the major contributor, with nitrogen oxides representing approximately 30 percent of the problem. As the second chart shows, highway vehicles are a negligible source of sulfur oxides but are a somewhat greater source of the nitrogen oxides that make up the total acidity. Combining both pollutants, the potential contribution of motor vehicles to Northeast acid deposition is about 10 percent of the total. This is explained in more detail in our full, written testimony. Therefore, almost 90 percent of the acid rain precursors in the Northeast region originate with sources other than cars and trucks. Furthermore, motor vehicle NO_x emissions will continue to decline as passenger cars meeting the existing 1.0 gram per mile NO_x standard replace older, higher-emitting cars. Because that standard only became fully effective in 1985, most of its benefits are still ahead of us.

In addition, light- and heavy-duty trucks will be required to meet new, more stringent NO_x standards in the 1988 model year, and heavy-duty engines will have to meet even more stringent NO_x standards in the 1991 model year.

On the question of technical feasibility, the fact sheet distributed at the time that S. 2203 was first introduced—and it has been alluded to since in these hearings—stated that "the bill proposes that the entire light-duty fleet meet standards now being met by 25 percent of the cleanest models." However, examination of the data reveals, and this chart 3 shows, which we will put up, that while 25 percent may meet the proposed standard for 1 individual pollutant or another, only 17 car models—or 3 percent of the 574 tested—meet all of the number values proposed by S. 2203, and no light-duty trucks or heavy-duty gasoline engines meet all three requirements. The manufacturer, however, must certify that its vehicles can comply with the standards for all three automotive pollutants—hydrocarbons, carbon monoxide, and oxides of nitrogen—to offer a vehicle for sale.

Compounding the problem is the fact that none of the vehicles nor engines tested have been shown to meet the proposed standards at the 100,000 mile level also proposed by S. 2203.

The doubling of the useful life and warranty duration to 10 years or 100,000 miles virtually doubles the stringency of the standards and would mean, effectively, a zero emission requirement.

Even tighter controls would impose fuel economy, vehicle hardware, and other consumer costs. Individual manufacturers can more appropriately address these points. However, I would note that while additional precious metal content—platinum and rhodium—may improve the catalyst performance slightly, the costs would be high and are likely to go higher as foreign source metal availability from either South Africa or the Soviet Union becomes a more significant problem, if not a supply constraint.

In summary, Mr. Chairman, we believe that more stringent motor vehicle emission controls are not warranted at this time; that the motor vehicle source requirements proposed by 2203 have not been demonstrated feasible and promise little or no environmental benefit, while penalizing fuel efficiency and raising consumer costs.

It seems to us that the better course is to stay the course with the extremely stringent standards that are now in place and continue to reap the benefits as new, more tightly controlled vehicles replace the older models on the road.

I appreciate the opportunity to present these views, and my fellow panelists will supplement, as you have indicated.

Senator **Stafford**. Thank you very much, Mr. Hanna.

Mr. Buist, you're next.

STATEMENT OF DONALD R. BUIST, DIRECTOR, AUTOMOTIVE EMISSIONS AND FUEL ECONOMY OFFICE, FORD MOTOR CO.

Mr. Buist. Thank you, Mr. Chairman. I am Don Buist, director of the Automotive Emissions and Fuel Economy Office of Ford Motor Co.

Tom Hanna gave you an overview of our concerns about the methodology and emission standards in S. 2203. Today, I'd like to speak about mobile source standards in S. 2203 from the manufacturer's design and compliance perspective.

Ford shares the concerns of this committee with acid rain control, but believes that mobile source regulations are not an appropriate or effective means of resolving these concerns.

What I would like to do in the next few minutes is try to clear up some apparent confusion between emission certification test data and the emission standards. The emission certification data—which were used by the committee staff in formulating S. 2203—are but one component in the manufacturer's overall responsibility to comply with the emission standards over a vehicle's useful life.

To help with this discussion, I'd like to direct your attention to the chart that we've just put up on the easel.

A manufacturer also has to take into account production and testing variability. As illustrated on the chart, these factors, along with anticipated deterioration with age, require manufacturers to design emission to levels 20 to 40 percent below the specified standards. This design task could be nearly doubled in stringency by the proposed revision to vehicle useful life requirements. I should note that this methodology for determining the 4,000-mile design level is fully recognized and accepted by the EPA and the California Air Resources Board.

It's not surprising, then, that virtually all cars and light trucks have certification levels well below the standards. If they did not, it would be impossible for a manufacturer's fleet to comply with all requirements for the useful life period.

S. 2203 would require an emissions design level for each of the individual pollutants so close to zero that a manufacturer could not reliably certify that a vehicle could be expected to maintain compliance in customer service. Moreover, the natural interaction of the three controlled pollutants in the combustion process makes it impossible to simultaneously control the emissions to the proposed levels for the useful life of the vehicle. It's this simultaneous control of three emission constituents that is required before we can market our vehicles.

Ford is proud of the progress it has made, not only in meeting emissions standards but in developing the technology that makes it possible today to achieve a 90-percent reduction without harmful effects to fuel economy, driveability, and performance. All of us remember the substantial customer dissatisfaction in the early years of emissions control. The requirements in S. 2203 would be technology-forcing to the same or greater degree as the standards that have just taken full effect. To embark on an all-new round of automotive emissions reduction for what are clearly very minimal air quality benefits is certain to have cost and performance penalties and could jeopardize the consumer acceptance of emissions technology.

Lastly, I should add a brief comment on heavy-duty gasoline-powered trucks. There are only three manufacturers of heavy-duty gas trucks, and these trucks have far different emissions characteristics than the diesel versions discussed by the previous heavy-duty truck panel.

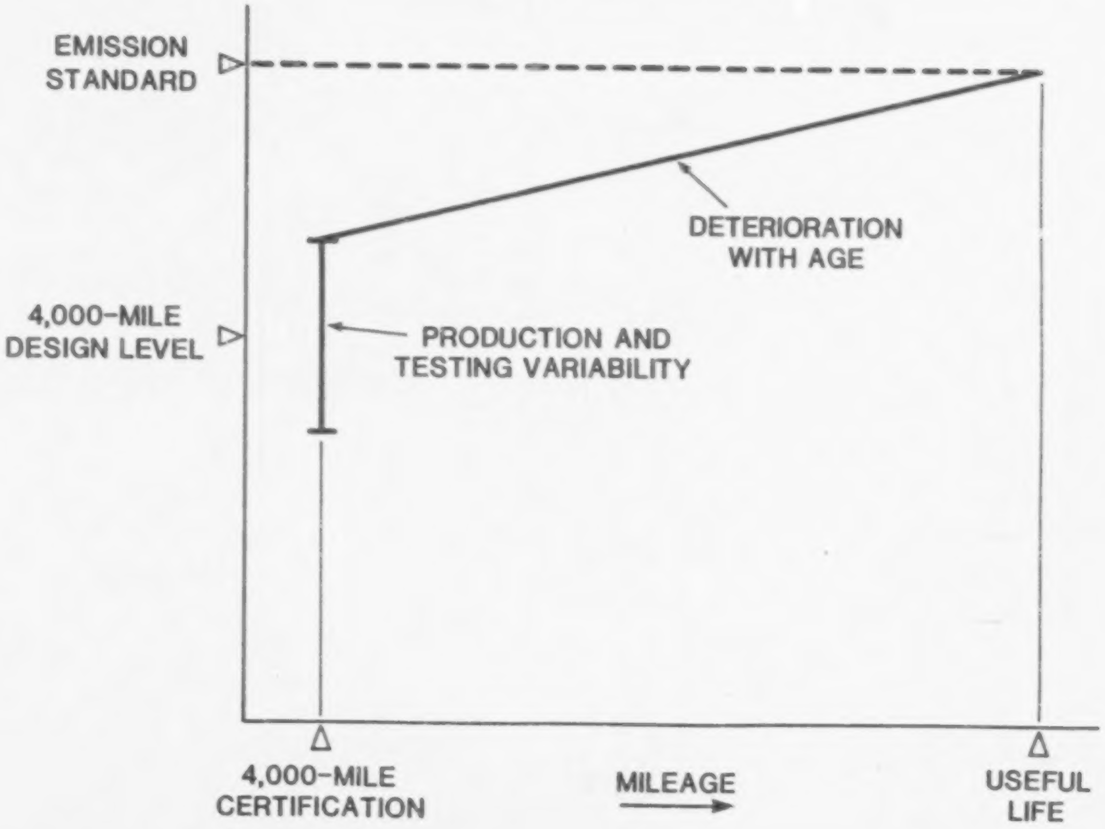
EPA recently set emissions standards for these trucks at the most stringent levels that it found technology could meet. In response to these standards, these trucks will employ essentially the same advanced emissions control technology as passenger cars by 1988. The effect of more stringent standards would be to eliminate such engines from the market. In its rule, EPA noted that no air quality gains would be achieved by imposing tighter standards because diesel engines would merely displace the gasoline versions.

In summary, the levels in S. 2203 are infeasible for cars, light- and heavy-duty trucks. We believe that tightening of automotive emission standards is not warranted in light of the air quality progress that is assured by existing requirements.

Thank you.

[An attachment to Mr. Buist's statement follows:]

RELATIONSHIP OF CERTIFICATION LEVELS TO EMISSIONS STANDARDS


EMISSION STANDARD
4,000-MILE DESIGN LEVEL
DETERIORATION WITH AGE
PRODUCTION AND TESTING VARIABILITY
4,000-MILE CERTIFICATION
MILEAGE
USEFUL LIFE

Senator **Stafford**. What are the names of the three companies that make the gasoline-powered trucks?

Mr. **Buist**. It's Ford, General Motors, and Chrysler.

Senator **Stafford**. OK, fine.

Mr. Padgham.

STATEMENT OF HOWARD B. PADGHAM, CHIEF ENGINEER FOR POWERTRAIN ENGINEERING PROGRAMS, CHRYSLER MOTOR CORP.

Mr. **Padgham**. I'd like to thank you for the opportunity to comment on S. 2203, which proposes amendments to the Clean Air Act, particularly for the purpose of controlling acid deposition. Chrysler is a member of the MVMA, and we would first like to endorse the MVMA statement on this bill. In the interests of the committee's time, I would like to address just three issues: available technology, impact of "in use" vehicle requirements, and the leadtime for developing new technology.

The first issue, available technology—through the years, Chrysler has played a key role in the auto industry's development of the emission control technology needed to meet the requirements of the current Clean Air Act. Although we share the committee's concern for potential acid rain problems, we believe the standards proposed for hydrocarbons, CO, and NO_x are an inappropriate response. They cannot be met with any technology that we know of, or expect to be able to develop in the near future. If such a technology were to be developed, we would expect it to involve major changes to both the basic engine and the entire emissions control system which, under any circumstances, would be a massive undertaking. Furthermore, having to meet these standards for 10 years or 100,000 miles substantially reduces the probability of finding such an effective technology.

The second issue, impact of "in use" requirements—although 3 percent of all car models are presently certified at levels which would meet the proposed standards, as pointed out earlier by Mr. Hanna, this does not demonstrate that those standards would be technologically feasible once the vehicles were in the customers' hands. Manufacturers must design emission control systems to achieve emission values well below the appropriate emission standards in order to assure that the vehicles will be in compliance with the standards during their entire useful life. This difference between the certification level and the standard represents a built-in safety margin to allow for production variations and any of the broad range of conditions to which vehicles are subjected during their useful life. Without this safety margin, large numbers of vehicles would exceed the emission standards in use and be subject to recalls, which—I might observe—are already occurring throughout the industry, even at the present standards.

It is simply a fact of life—because of Murphy's law, if you will—that you always have to aim higher and try harder than should be necessary if you want to ensure hitting the target. This means that to meet the standards in use, the required certification levels would have to be well below the standards proposed and in fact be near zero; in our view, that's a clearly unattainable task.

The third and last issue, leadtime for new technology—even if technology existed to meet the proposed standards, the planned timing of their introduction would make them virtually impossible to achieve. By way of illustration, at Chrysler we started our emissions durability fleets for the 1988 model year in July 1985 and expect to finish the data fleet certification testing in December of this year. We will be building advanced pilot vehicles in February 1987, leading to production in July 1987. In short, our 1988 model year is already locked in stone. For the 1990 model year, we have to start our emissions durability running in November 1987, which would leave barely a year from today to design and develop as yet unknown technology to meet these proposed standards for the 1990 model year. In our view, that is simply not realistic.

In conclusion, Chrysler has in the past—and will in the future—remain dedicated to the development of emission control technology necessary to meet the requirements of the Clean Air Act. Consistent with the terms of the Clean Air Act, however, those control requirements should be environmentally justifiable, technologically feasible, and economically practicable. I thank you.

Senator STAFFORD. Thank you very much, Mr. Padgham.

Dr. Klimisch, you're next.

STATEMENT OF RICHARD L. KLIMISCH, EXECUTIVE DIRECTOR, ENVIRONMENTAL ACTIVITIES STAFF, GENERAL MOTORS CORP.

Mr. KLIMISCH. We are extremely proud of the progress that we've made in controlling automotive emissions, and I understand the representative of NRDC yesterday acknowledged our leadership in this area. We can point to substantial improvements in air quality that have resulted, so that every county in this country will soon be in compliance with NO_2; compliance with carbon monoxide air quality standards is not far behind. Progress has been less dramatic for ozone, which is our most pressing air quality compliance problem. Two reasons for this are relevant to these proceedings.

First, automobiles represent only a minor part of the ozone problem, and we estimate—based on recent EPA projections—that passenger car hydrocarbons will soon be less than 10 percent of the total hydrocarbon emissions in this country.

Second, it is becoming increasingly accepted in the scientific community that reductions in nitrogen oxides make it more difficult to achieve compliance with ozone air quality standards.

I would also point out that NO_x-derived species play a minimal role in those adverse effects attributed to acid rain. In fact, those same nitrogen species are known to provide beneficial effects to the unmanaged ecosystem. The tradeoffs involved here with NO_x are complex and counterintuitive, and are widely ignored. As it happens, there are other tradeoffs in this field that are ignored as well. For example, there are tradeoffs between emissions on individual vehicles; thus, changes that one makes to reduce NO_x emissions tend to increase hydrocarbon and CO emissions and vice versa.

Similarly, there are tradeoffs between certification standards and real world emissions. I believe the focus this morning has been all wrong in terms of meeting standards. Our real problem is meeting the standards in customer use. Furthermore, that's what's important in terms of air pollution. We now know that the biggest gains in the future will come from reducing those emissions of vehicles in customer use, and there is very little, indeed, to be gained by reducing the standards. In fact, we believe that a standard reduction at this time will cause real world emissions—what's important for air pollution—actually to increase because it will divert those scarce engineering resources from in use emissions back to the artificial exercise of certification.

The tradeoffs with respect to heavy-duty truck standards are similar and include some severe economic impact on the already-beleaguered truck industry. The risks and costs will be very high. In contrast to what many think, you can't just slap catalysts on trucks, and this is because of temperature problems. The temperatures get too high with gasoline trucks, so the catalysts tend to burn up; and with diesel-powered trucks, the temperatures don't get high enough for catalysts to work very well.

The environmental benefits will be quite small, as trucks just don't make a very large contribution to overall pollution.

One of the greatest difficulties in all of this has to do with precious metals. Even without the standard reductions, rhodium supply is approaching a crisis situation. Rhodium is the essential ingredient for reducing NO_x emission; its demand is increasing, not only in the United States, which currently uses most of the world's rhodium production, but in Canada, Europe, and Asia as well. We simply can't get any more.

There is no doubt that S. 2203 will make this situation worse and will put pressure on the auto industry to make large financial commitments in South Africa.

To conclude, I would like to add that we fully support the goals of this bill; that is, to provide a cleaner and healthier environment. We also recognize the ongoing public support for this goal, but we are forced to conclude that this particular bill, S. 2203, will not advance us toward that goal but will instead use up valuable technical, financial, and natural resources that can be better used elsewhere.

Thank you.

Senator STAFFORD. Thank you, Dr. Klimisch.

The next witness will be Mr. Dietmar Haenchen, who is with Volkswagen of America.

STATEMENT OF DIETMAR HAENCHEN, EXECUTIVE ENGINEER, VEHICLE REGULATIONS DEPARTMENT, VOLKSWAGEN OF AMERICA

Mr. HAENCHEN. Thank you for the opportunity to present Volkswagen's views on the mobile source provisions of S. 2203.

S. 2203 proposes to establish a program to reduce acid deposition. The contribution of motor vehicles to acid deposition is small, and a precise connection between auto emissions and the effects of acid deposition has yet to be formulated. Therefore, more stringent standards for mobile sources will have only limited significance in reducing acid deposition.

S. 2203 offers more stringent standards for all regulated exhaust emissions from both cars and light trucks. In addition, S. 2203 seeks to extend the current definition of "useful life" to 10 years and 100,000 miles. The combined effects of these proposals would place upon the manufacturer a regulatory burden never before experienced.

The light-duty vehicle exhaust emission standards are reported to represent the 25 percent cleanest vehicles of the 1986 average certification levels. The 1986 certification data actually show that only 3 percent of the 1986 fleet complies with these standards at 50,000 miles, not a representative sample for justification that S. 2203 standards can be met using current technology.

The revised definition of "useful life" makes the feasibility of meeting such standards more complex. No light-duty vehicle has been certified to such stringent standards at 100,000 miles, and it is doubtful that it could be done. Current vehicles are unable to meet the S. 2203 standards at 50,000 miles; doubling the useful life to 100,000 miles increases the stringency significantly.

S. 2203 fails to recognize the difficulties associated with emissions compliance "in use." Certification vehicles are operated and maintained under highly controlled conditions. In reality, the manufacturer must design all vehicles to comply with the emissions standards when certified, and when subjected to in use conditions beyond its control. Technically feasible standards must be based on the capability of complying for the useful life of the vehicle while in the hands of the consumer. With these conditions in mind, Volkswagen finds S. 2203 emissions standards unrealistic.

The 1986 certification data shows that, while exhibiting low HC and CO emissions, no diesel vehicles ever come close to meeting the S. 2203 NO_x standard. For Volkswagen diesel vehicles, further NO_x control is not technologically feasible. At 0.25 grams per mile NO_x, it would mean the demise of diesel engines for passenger cars. Diesels must survive in the marketplace as a technology to fall back on in the event of a third energy crisis.

In summary, Volkswagen believes that the light-duty mobile source provisions of S. 2203 are unreasonable and unnecessary. Control technology cannot be developed in the foreseeable future to comply with these standards for the full useful life of the vehicle. The automobile's contribution to acid deposition is small, and does not warrant further mobile source controls.

Finally, EPA is currently refining existing emission regulations to assure that real emission reductions are achieved by in use vehicles, and also promulgating new standards for certain motor vehicles. In light of these actions, Volkswagen recommends deletion of the mobile source provisions of S. 2203.

Thank you.

Senator **STAFFORD**. Thank you very much, sir.

And finally, the last witness will be Mr. Gregory Dana, technical director of Automobile Importers of America.

STATEMENT OF GREGORY DANA, TECHNICAL DIRECTOR, AUTOMOBILE IMPORTERS OF AMERICA

Mr. **DANA**. Good morning. My name is Gregory Dana. I am technical director of the Automobile Importers of America.

I am grateful for this opportunity to testify today, and I will give a brief summary of my written comments.

AIA is a nonprofit trade association that represents U.S. importers of passenger cars and light trucks. As such, AIA members account for over 90 percent of the vehicles imported into the United States.

I am pleased to have this opportunity to present the views of AIA on S. 2203 and S. 2813. As background for our comments, it should be noted that AIA companies have been leaders in the development of emission control systems for motor vehicles. The closed-loop three-way catalyst system and multiport fuel injection systems which more precisely meter air/fuel ratio are two of the more notable examples of the innovations developed by AIA companies. Other less well-known—but nonetheless important—technology advances have been developed and are being used by AIA companies. It is against this background of technological innovation that our comments are being made.

AIA's most fundamental comment on this bill relates to the question of need for more stringent requirements for motor vehicles. AIA recognizes the concern this committee has over acid deposition, but we are unaware of a substantial scientific basis that would justify the imposition of new technology on motor vehicles that could be costly to consumers.

Vehicle manufacturers have already reduced tailpipe hydrocarbon and NO_x emissions by 95 percent and 75 percent respectively, from passenger cars. Light-duty trucks have achieved nearly similar percentage reductions for these pollutants. With respect to hydrocarbons and oxides of nitrogen, the relative contribution of mobile sources to total emissions has decreased in spite of growth in vehicle usage. Given the limited impact of mobile source NOx on acid deposition, and that even further reductions will be achieved as new vehicles replace older, more polluting vehicles, additional or more stringent requirements are not justified. In fact, more stringent standards might well reduce the replacement of old vehicles and thus be counterproductive. This is particularly true in the case of lower priced vehicles because a significant cost increase will lead lower income individuals to retain their existing vehicles or to purchase a used car instead of a new one. In these cases, turnover of the vehicle fleet to newer, less polluting vehicles would be hindered.

Turning to the specific provisions of S. 2203, section 3 contains stringent new standards for passenger vehicles and light- and heavy-duty trucks, as well as requirements to double the useful life of a passenger vehicle. Simply put, we know of no technology that is capable of achieving the passenger vehicle and light-duty truck standards, particularly in view of the 10 year/100,000 mile useful life proposal. Meeting the combination of radically reduced hydrocarbon, CO, and NO_x standards, plus double the useful life in 3 years, presents an engineering problem of enormous proportions. Given the state of emission control technology as it exists and as it can be foreseen, the radical breakthrough needed to meet the standards contained in this bill is not in sight.

Time alone will not alleviate the engineering problems with the mobile source requirements of this bill. The problem is with the standards themselves. Simply put, there is no demonstrated need for the levels proposed in the bill. It is difficult, for example, to determine the rationale for a nearly threefold decrease in CO and HC emissions in a bill whose primary goal appears to be acid precipitation control. Therefore, we respectfully urge the committee to delete sections 3 (a) through (e) from this bill.

While vastly less onerous in its mobile source provisions as compared to S. 2203, S. 2813 would also lead to large incremental costs with little overall benefit to acid precipitation control. Any increased demand for rhodium use, which would be required by lower NO_x standards, should be carefully considered given the instability in South Africa and its effect on price and supply of this mineral and the already known demand increase caused by adoption of three-way catalyst technology by Canada and some of the European countries.

Again, I thank the committee for this opportunity to appear before you and will be happy to answer any of your questions.

Senator Stafford. Well, gentlemen, I thank you all for coming this morning and giving us your counsel on legislation in front of the committee. I can't help but note that we've been criticized—as far as this bill is concerned—both for being too strict in some of the requirements, and by another witness, for being too lax in what we're requiring of industry in terms of controls. So it suggests to me that at least some parts of this bill may fall about where the public wants them to.

I may have some questions in writing. If it's agreeable, gentlemen, I would submit them to you in that way rather than take the time now.

Senator Stafford. Senator Chafee.

Senator CHAFEE. Mr. Chairman, I have a couple of questions.

Mr. Padgham is that the correct pronunciation?

Mr. PADGHAM. Correct, yes.

Senator CHAFEE. You were talking about recalls of vehicles because they couldn't meet the present standards. Has that actually occurred? Have there been recalls?

Mr. PADGHAM. I speak only for Chrysler, but that indeed has happened. And believe me, it wasn't deliberate.

Senator CHAFEE. Oh, I know. I can agree with that. I can agree it wasn't deliberate, but it has occurred?

Mr. PADGHAM. Yes, indeed, in spite of our best efforts and having certification levels which were well below the established standards.

Senator CHAFEE. How about the others, Mr. Buist and Mr. Klimisch, Dr. Klimisch?

Mr. BUIST. Same situation, Senator.

Mr. KLIMISCH. Yes, sir, we've had that happen with vehicles, and there's nothing wrong with the vehicles; no defects. It's just production variability.

Senator CHAFEE. What about the California standards? You were here during the previous testimony when they cited what California requires. Dr. Klimisch, what do you do at GM about the California situation?

Mr. KLIMISCH. Well, in California the CO and hydrocarbon standards are less stringent, and that makes it easier to achieve the lower NO_x out there. We think that's the wrong thing for them to do, but it makes it feasible. There are tradeoffs between the emissions, and that's the only reason we can achieve their standard now. They have some new standards, and we're not sure how we're going to reach them.

Senator CHAFEE. How do you adjust your vehicles for California? I suppose that's—what, 15 or 20 percent of your market, overall, 15 percent, maybe?

Mr. KLIMISCH. I wish it was. It's less than 10 percent for us. But we have some vehicles which can meet California and Federal standards, but in most cases we have to have special systems engineered for the California market, and that's very expensive.

Senator CHAFEE. Is that the same with you, Mr. Padgham?

Mr. PADGHAM. Yes.

Senator CHAFEE. Now, in all the testimony you present your graphs and show that, yes, you can produce a car that can meet the NO_x, but if you do that you can't meet the hydrocarbons, for example. It's very hard to get the equation so that it can cover all. Yet you said that 3 percent of the vehicles—I think each of you testified to this; at least Mr. Hanna did on one of his charts—3 percent of the vehicles would meet, what, the standards set forth in this bill?

Mr. HANNA. Yes, but not demonstrated at the 100,000 certification level.

Senator CHAFEE. In other words, what I can't understand—I know there are problems here, and I won't gainsay those, but—now, here, percentage of 1986 passenger car certification test results that meet proposed S. 2203 emission standards. Now, some of them do; the matrix shows that 3 percent do. Now, what are the three percent, just out of curiosity? The 3 percent of those vehicles? Are they very light vehicles, or what?

Mr. KLIMISCH. They would tend to be light vehicles, but they're really due to measurement variability. But that doesn't meet the standards. The problem is to meet the standards in the real world; otherwise, they can recall the vehicles. That's the problem. Certification is relatively easy; the problem is customer use, the real world.

Senator CHAFEE. You mean the customers abuse——

Mr. KLIMISCH. No, I mean these are special vehicles under special conditions. But the customer, the real world where we need to concentrate on, we have to meet those standards there too, and that's much more difficult than is the certification process.

Senator CHAFEE. Well, what are the vehicles that meet the certification?

Mr. HANNA. I don't have that list immediately in front of me. We can provide it to you, Senator, but it is a list of vehicles, I think, produced by about 10 different manufacturers, none of whom do that with all of their production. But we can provide you with that list, certainly. Yes, sir.

Senator CHAFEE. All right. I would be interested. [See p. 298.]

Now, rhodium—who touched on rhodium? I think it was Dr. Klimisch? Where does rhodium come from? South Africa?

Mr. **Klimisch**. About 85 percent of it is from South Africa. There's a little bit of it available from Russia, but they are an unreliable source. Any increase will have to come from South Africa, which is more reliable.

Senator **Chafee**. Yes. I suppose we're not gaining great favor with the South Africans recently.

Any domestically?

Mr. **Klimisch**. There's none domestically. There continue to be rumors that people have found some, but there isn't any production in the United States at this point that I know of. The big increases, the large amounts, just have to come from South Africa.

Senator **Chafee**. All right. Fine. Well, thank you all very much for coming; we appreciate it, and that concludes the hearing.

[Whereupon, at 12:35 p.m., the hearing adjourned, to reconvene at the call of the Chair.]

[Statements submitted for the record follow:]

Testimony of

THOMAS J. KALITOWSKI
Executive Director
MINNESOTA POLLUTION CONTROL AGENCY

BEFORE THE

SENATE ENVIRONMENT AND PUBLIC WORKS COMMITTEE
HEARING ON ACID RAIN

September 26, 1986

Good morning Mr. Chairman and Senators. I want to thank you for this opportunity to provide the Committee with the Minnesota Pollution Control Agency's (MPCA) views and concerns regarding acid deposition control legislation, and to share with you our recent accomplishment of promulgating an Acid Deposition Standard and Control Plan for the State of Minnesota. The MPCA has commented on acid rain legislation several times since bills were first proposed in Congress, both through Senator Durenberger's office and through members of Minnesota's Congressional delegation. The Senator, and other members of this Committee have always given our comments thoughtful consideration, and for that I thank you.

As you know, acid deposition is of great concern to Minnesotans. The same glacial action that sculpted our landscape and left us blessed with thousands of sky-blue lakes and streams, and millions of acres of beautiful and productive forests; also left us with an environment that is highly sensitive to acid deposition. This is because the glaciers, through their scouring

ACTION, LEFT VERY THIN SOILS AND EXPOSED BEDROCK, BOTH OF WHICH HAVE LOW CAPACITIES TO NEUTRALIZE ACID DEPOSITION.

THE U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA) RECENTLY RELEASED THE RESULTS OF THEIR MULTI-MILLION DOLLAR NATIONAL LAKE SURVEY. THOSE RESULTS SHOWED THAT MINNESOTA, FLORIDA, MAINE, NEW YORK, AND WISCONSIN ALL HAVE OVER 1,000 LAKES THAT ARE SUSCEPTIBLE TO ACID RAIN. WE, IN MINNESOTA, HAVE KNOWN THAT FOR A LONG TIME.

WE HAVE BEEN STUDYING THE IMPACTS OF ACID RAIN IN MINNESOTA SINCE 1978. ALTHOUGH MINNESOTA IS KNOWN AS THE LAND OF 10,000 LAKES, WE REALLY HAVE SEVERAL THOUSAND MORE THAN THAT. OUR OWN STUDIES INDICATE THAT ABOUT 2,500 OF OUR LAKES ARE SUSCEPTIBLE; THAT INCLUDES 25% OF THE LAKES THAT ARE CLASSIFIED AS FISHING LAKES.

WE ALSO HAVE FOUND THAT WE HAVE TROUT STREAMS, WETLANDS, AND PEATLANDS THAT ARE SUSCEPTIBLE TO ACIDIFICATION; ENDANGERING HABITATS FOR STREAM TROUT, WATERFOWL, AND MANY RARE OR ENDANGERED PLANT SPECIES. IN ADDITION, ALTHOUGH LESS SENSITIVE THAN LAKES, WE HAVE MILLIONS OF ACRES OF FOREST SOILS THAT MAY BE SUSCEPTIBLE TO ACID DEPOSITION.

NOW LET ME DESCRIBE THE RULEMAKING PROCESS WE HAVE JUST COMPLETED THAT RESULTED IN THE PROMULGATION OF AN ACID DEPOSITION

STANDARD AND CONTROL PLAN; BECAUSE MUCH OF WHAT WE HAVE LEARNED THROUGH THAT PROCESS, RELATES TO MY COMMENTS ON FEDERAL LEGISLATION.

IN 1982, THE MINNESOTA LEGISLATURE PASSED INTO LAW THE MINNESOTA ACID DEPOSITION CONTROL ACT (ACT). THIS ACTION WAS TAKEN WITH THE REALIZATION THAT THE ENVIRONMENT IN MINNESOTA WAS ENDANGERED AND THAT FEDERAL ACTION WAS NOT EMINENT. THE ACT REQUIRED A FORMAL INVENTORY OF SENSITIVE RESOURCES AND THE PROMULGATION OF AN ACID DEPOSITION STANDARD AND CONTROL PLAN BY 1986.

AT THE TIME THIS BILL WAS PASSED, MANY CRITICS SAID THAT WE DO NOT KNOW ENOUGH ABOUT THE SCIENCE OF ACID RAIN TO PROMULGATE STANDARDS OR TO DEVELOP CONTROL PLANS. I KNOW THAT YOU HAVE BEEN HEARING SIMILAR COMMENTS ABOUT FEDERAL ACTION. I THINK OUR HEARING RECORD, AND THE FINDINGS OF FACT OF THE ADMINISTRATIVE LAW JUDGE WHO PRESIDED OVER THE HEARINGS, PRETTY WELL PUT THAT TIRED EXCUSE TO BED. FOR THE FACT IS, WE DO KNOW ENOUGH TO TAKE REASONABLE, NECESSARY ACTION.

IN ORDER TO SUCCESSFULLY PROMULGATE OUR STANDARD AND CONTROL PLAN, WE HAD TO DEMONSTRATE THE NEED AND REASONABLENESS OF OUR PROPOSED REGULATIONS. AFTER A RULEMAKING HEARING THAT SPANNED THE COURSE OF 5 MONTHS, INCLUDED THE TESTIMONY OF 75 EXPERT WITNESSES FROM AROUND THE WORLD, AND GENERATED 6,000 PAGES OF

TRANSCRIPTS AND OVER 1,000 EXHIBITS; THE ADMINISTRATIVE LAW JUDGE DETERMINED THAT WE DID INDEED DEMONSTRATE THE NEED AND THE ECONOMIC AS WELL AS SCIENTIFIC REASONABLENESS FOR ACID RAIN CONTROLS. SPECIFICALLY, THE JUDGE STATED THAT EVEN THOUGH THERE REMAIN QUESTIONS OF THE CAUSES, SOURCES, AND EFFECTS OF ACID RAIN, THERE IS ENOUGH KNOWN TO CONCLUDE THAT ACID RAIN MUST NOT CONTINUE UNABATED.

AS A RESULT OF THESE HEARINGS, THE MPCA BOARD ADOPTED AN ACID DEPOSITION STANDARD OF 11 KILOGRAMS PER HECTARE PER YEAR OF WET SULFATE DEPOSITION AND A CONTROL PLAN THAT WILL REQUIRE REDUCTIONS IN EMISSIONS FROM 1980 LEVELS, SIMILAR TO THE REDUCTIONS THAT WOULD BE REQUIRED IN MINNESOTA BY NEARLY ALL OF THE PROPOSED FEDERAL LEGISLATION TO DATE.

OUR REGULATIONS, COUPLED WITH THE ACTIONS TAKING PLACE IN NEW HAMPSHIRE, NEW YORK, AND WISCONSIN, SHOULD DEMONSTRATE THAT WE DO HAVE ENOUGH SCIENTIFIC BASIS TO BEGIN REGULATING ACID RAIN. EVEN THOUGH FACING THE ENORMOUS DIFFICULTY OF UNILATERAL ACTION, FOUR STATES HAVE, THROUGH THEIR ACTIONS, DEMONSTRATED THE IMPORTANCE OF THIS ISSUE. HOWEVER, IT IS CLEAR THAT WHILE INDIVIDUAL STATE ACTION IS IMPORTANT, NATIONAL ACTION IN COOPERATION WITH CANADA, AND MEXICO IS CRITICAL.

WITH THAT BACKGROUND INFORMATION IN MIND, I NOW WOULD LIKE TO ADDRESS SPECIFICALLY THE PROVISIONS OF TWO BILLS IN FRONT OF

YOU, S.2203 AND S.2813. WHILE BOTH OF THESE BILLS ARE DIFFERENT, BOTH SEEK THE SAME IMPORTANT GOAL - MAJOR REDUCTIONS IN ACID FORMING EMISSIONS. YOU WILL SEE FROM MY COMMENTS THAT I WILL PREFER SOME ASPECTS OF EACH BILL. LET ME STRESS THAT PROTECTION OF THE ENVIRONMENT IS OF UTMOST IMPORTANCE, CONSEQUENTLY, WE COULD SUPPORT EITHER OF THESE BILLS.

FIRST, WE BELIEVE THAT REDUCTIONS IN SULFUR DIOXIDE EMISSIONS ON THE ORDER OF ABOUT 50% ARE NECESSARY. BOTH BILLS ACCOMPLISH THIS GOAL IN DIFFERENT MANNERS. S.2203 RESULTS IN GREATER REDUCTIONS IN EMISSIONS WHICH IS BENEFICIAL BUT AT SIGNIFICANTLY GREATER IMMEDIATE COSTS; WHILE THE REDUCTION APPROACH IN S.2813 ALLOWS MORE FLEXIBILITY AND THUS LOWER IMMEDIATE COSTS. OUR DISCUSSIONS WITH INDUSTRY LEADERS INDICATES THAT FLEXIBILITY IN MEETING REDUCTION GOALS IS VERY IMPORTANT TO HOLDING DOWN COSTS. THE OPPORTUNITY TO ALTER PHASE II GOALS IN S.2813 IS A GOOD PROVISION WHICH ALLOWS FOR CONSIDERATION OF THE MILLIONS OF DOLLARS OF RESEARCH CURRENTLY UNDER WAY. OUR STATE CONTROL PLAN HAS A SIMILAR PROVISION.

SECOND, BOTH BILLS REQUIRE MODEST REDUCTIONS IN NITROGEN DIOXIDE EMISSIONS. WHILE SUCH REDUCTIONS ARE DESIRABLE, WE HAVE LEARNED THROUGH OUR HEARINGS THAT THE SCIENCE ON THE EFFECTS OF NITROGEN OXIDES AND NITRIC ACIDS ON THE ACID RAIN PROBLEM IS NOT YET AS SOUND AS IT IS FOR SULFUR COMPOUNDS. WE DO SUPPORT NITROGEN OXIDE EMISSION REDUCTIONS, BUT WOULD HATE TO SEE REDUCTIONS

IN SULFUR DIOXIDE EMISSIONS HELD UP IN CONGRESS OVER ARGUMENTS ABOUT NITROGEN OXIDE EMISSIONS. IN THE FACE OF SUCH CONTROVERSY, ONE SOLUTION MIGHT BE TO REQUIRE NITROGEN OXIDE EMISSIONS REDUCTIONS IN A SECOND PHASE AFTER ADDITIONAL SCIENTIFIC REVIEW.

THIRD, WE PREFER TO SEE ALL STATES INCLUDED IN THE REDUCTION REQUIREMENTS. OUR OWN STUDIES HAVE SHOWN THAT STATES LIKE TEXAS, NORTH DAKOTA,AND WYOMING ARE MORE IMPORTANT CONTRIBUTORS TO ACID RAIN IN MINNESOTA THAN STATES LIKE OHIO OR WEST VIRGINIA. WHILE THE 31 STATE APPROACH IN S.2813 WILL SIGNIFICANTLY REDUCE DEPOSITION IN MINNESOTA, A 48 STATE APPROACH, AS IN S.2203, IS MORE DESIRABLE.

FOURTH, WE BELIEVE A PERMANENT CEILING OR CAP ON EMISSIONS IS WARRANTED TO ENSURE THAT EMISSIONS DO NOT SLOWLY CREEP BACK UP IN THE FUTURE. EVEN THOUGH PLANT REPLACEMENTS AND NEW TECHNOLOGY BREAKTHROUGHS ARE LIKELY TO LIMIT EMISSION GROWTH, AN EMISSIONS CAP WOULD ENCOURAGE APPLICATIONS OF NEW TECHNOLOGY AND PROTECT THE IMPORTANT EMISSION REDUCTIONS WE ARE FIGHTING SO HARD TO ACHIEVE. WE BELIEVE S.2203 SEEKS TO ADDRESS THIS CONCERN THROUGH THE NEW SOURCE REQUIREMENTS IN SECTION 2 (A) OF THE BILL.

FIFTH, WE BELIEVE THAT STRENGTHENING LANGUAGE SHOULD BE ADDED TO THE EXISTING PROVISIONS IN THE CLEAN AIR ACT FOR INTERSTATE TRANSPORT OF POLLUTANTS. CURRENT PROVISIONS DO NOT

RECOGNIZE ACID DEPOSITION AS A POLLUTANT. AS A RESULT, LEGITIMATE LEGAL ACTION TAKEN BY MANY STATES, INCLUDING MINNESOTA, HAS BEEN IMPEDED. SECTIONS 110 AND 126 MUST BE STRENGTHENED TO ENSURE THAT ONE STATE IS PREVENTED FROM EMITTING AIR POLLUTION WHICH COULD ENDANGER PUBLIC HEALTH OR WELFARE IN ANOTHER STATE, REGARDLESS OF VIOLATIONS OF AMBIENT STANDARDS. MODIFICATION OF THESE SECTIONS OF THE ACT BECOMES EVEN MORE IMPORTANT IF LEGISLATION IS NOT APPLIED TO ALL STATES. IN ADDITION, SUCH MODIFICATIONS WOULD BE OF BENEFIT IN FUTURE ACTIONS REGARDING AIR TOXICS - AN ISSUE OF GROWING IMPORTANCE AND CONCERN. S.2203 ADDRESSES THIS ISSUE IN PART UNDER THE MISCELLANEOUS PROVISIONS.

FINALLY, LET ME BRIEFLY ADDRESS THE ISSUE OF WHO SHOULD PAY FOR ACID RAIN LEGISLATION. WE DO NOT PREFER A COST SHARING APPROACH, AND I AM HAPPY THAT NEITHER S.2203 NOR S.2813 HAVE SUCH PROVISIONS. WE BELIEVE STATES LIKE MINNESOTA THAT HAVE ALREADY INVESTED HUNDREDS OF MILLIONS OF DOLLARS IN SULFUR DIOXIDE CONTROLS SHOULD NOT HAVE TO PAY FOR REDUCTIONS IN OTHER STATES. OUR OWN CONTROL PLAN WILL REQUIRE THE ADDITIONAL INVESTMENT OF MILLIONS MORE IN CONTROLS REGARDLESS OF WHETHER FEDERAL LEGISLATION IS ENACTED. HOWEVER, THE MINNESOTA POLLUTION CONTROL AGENCY AS WELL AS THE MINNESOTA DEPARTMENT OF ENERGY AND ECONOMIC DEVELOPMENT AND THE DEPARTMENT OF PUBLIC SERVICES, ARE IN UNANIMOUS AGREEMENT THAT, IF SOME MODEST - AND I EMPHASIZE MODEST - COST SHARING OR LOAN ASSISTANCE PROGRAM IS NECESSARY TO POLITICALLY EXPEDITE LEGISLATION, WE ARE WILLING TO ACCEPT THE

CONCEPT AS A REQUIREMENT TO ENSURE ADEQUATE AND TIMELY ENVIRONMENTAL PROTECTION.

OUR EXPERIENCE IN MINNESOTA IN PROMULGATING AN ACID DEPOSITION STANDARD AND CONTROL PLAN HAS PROVIDED IMPORTANT INSIGHT INTO THIS COMPLEX AND CONTROVERSIAL ISSUE. WE HAVE DEMONSTRATED THAT THERE IS ENOUGH KNOWN TO BEGIN REASONABLE CONTROLS TO REDUCE ACID DEPOSITION. WE HAVE DONE WHAT THE ENVIRONMENTAL PROTECTION AGENCY AND MANY OTHERS HAVE SAID CANNOT BE DONE. WE HAVE RELATED THE SOURCES OF ACID RAIN TO ENVIRONMENTAL EFFECTS. WE PUT ACID RAIN ON TRIAL AND SULFUR DIOXIDE WAS FOUND GUILTY OF HARMING THE ENVIRONMENT. WE ALSO DEMONSTRATED THAT THE COSTS OF CONTROLS ARE OVERSHADOWED BY THE BENEFITS. BENEFITS IN MINNESOTA ALONE RANGE FROM BETWEEN $78 MILLION UP TO $260 MILLION PER YEAR. I AM SURE THAT IF ACCURATE FIGURES COULD BE GENERATED, WE WOULD FIND THAT THE BENEFITS NATIONWIDE WOULD BE STAGGERING.

THANK YOU AGAIN FOR THIS OPPORTUNITY TO OFFER COMMENTS. IN ADDITION TO MY TESTIMONY, I HAVE BROUGHT A COPY OF OUR ACID RAIN RULE AND THE FINDINGS OF FACT OF THE ADMINISTRATIVE LAW JUDGE FOR THE RECORD. I HAVE A HIGHLY SKILLED STAFF WHO WILL BE HAPPY TO ASSIST THE COMMITTEE STAFF IN ASSESSING ANY ISSUES RELATING TO THIS IMPORTANT LEGISLATION. I WISH YOU WELL IN YOUR EFFORTS TO PASS AN EFFECTIVE ACID DEPOSITION CONTROL PROGRAM.

Testimony of David D. Doniger
Senior Attorney, Natural Resources Defense Council
on behalf of the National Clean Air Coalition
in Support of S. 2203, The New Clean Air Act
Committee on Environment and Public Works
U.S. Senate, Washington, D.C.
Friday, September 26, 1986

Mr. Chairman and members of the committee, sharp further reductions are needed in all six major pollutants from motor vehicles and fuels: hydrocarbons, carbon monoxide, nitrogen oxides, particulate matter, sulfur, and lead. Each of these pollutants continues to endanger public health and welfare. Sixteen years after the Clean Air Act was passed, half the U.S. population still lives in areas with unhealthy, dangerous levels of air pollution, and long-distance transport of pollution still is destroying lakes, forests, crops, buildings, and other man-made materials.

Even though important progress has been made, motor vehicles still remain one of the largest contributors to these serious pollution problems. Hydrocarbons from tailpipes, from vehicle refueling, and from fuel evaporation cause violations of the health-based ambient air quality standard for ozone in most of the nation's large urbanized areas. Up to 45 such areas will not meet the present ozone standard by the December 31, 1987, deadline. Carbon monoxide levels, which are dominated by vehicle emissions, still exceed safe levels in cities that are home to tens of millions of people.

NO_x emissions from vehicles contribute to violations of the current public health standards for nitrogen dioxide and ozone, and to acid deposition hundreds of miles downwind. Diesel particulate emissions, which are projected to steadily rise even under EPA's standards, are already causing as many as several hundred lung cancer cases and thousands of cases of other respiratory disease each year. Lead in gasoline is still endangering tens of thousands of children, and sulfur in diesel fuel contributes to unhealthy SO_2 levels in urban areas and acid rain downwind.

As if the current situation were not bad enough, EPA will soon have to tighten the ambient standards for four of these pollutants, because the most up-to-date scientific studies show that asthmatics, children, and even healthy adults are harmed at much lower pollution levels than previously documented. The allowable level of ozone needs to be reduced by as much as a third. Tight one-hour standards are needed for both sulfur dioxide and nitrogen dioxide. And the new particulate standard, focussed on smaller particles, also must be effectively more stringent than the current standard.

It is with this sense of the public health and environmental need that the National Clean Air Coalition reviews the mobile source provisions of S. 2203. The Coalition strongly supports S. 2203's strengthened emission standards for HC, CO, and NO_x from automobiles and light trucks. The time has come to reorient auto emission controls to what the best performing cars can do, not the worst performing models. The feasibility of these emission standards has already been demonstrated. Taking advantage of the latest generation of catalyst technology, fuel injection systems, and electronic computer controllers, one-fourth of current engine families -- both big cars and small -- already meet or better these standards. There is no reason why the rest of the new car and light truck fleet cannot match these leaders.

The bill's particulate standard for diesel cars and light trucks needs to be tightened, however. California already limits diesel particulate to 0.08 grams per mile, a 60 percent greater reduction than the out-dated federal standard. The EPA standard is so lax that many diesel cars and light trucks are able to meet it without any tailpipe pollution controls. The standard in S. 2203 should be tightened at least to the California level.

The Coalition supports other important requirements in the bill such as removing lead from gasoline and sulfur from diesel fuel. Recent studies show that lead impairs the health of children at even lower levels than previously believed. There is just no excuse for continuing to expose children to any lead from auto exhaust. Sulfur in diesel fuel contributes to ambient SO_2 levels dangerous to health and to acid rain. EPA studies show that removing sulfur from diesel fuel would save each truck owner hundred of dollars per year in maintenance expenses now devoted to combatting corrosion and wear, to say nothing of the substantial health and environmental benefits.

The Coalition supports the bill's establishment of auto inspection and maintenance programs for NO_x. Likewise, we support the extension of the official "useful life" for light-duty vehicles to 10 years or 100,000 miles. Pretending that cars operate for only five years or 50,000 miles, the current useful life, is like pretending people live only 35 years.

The Coalition supports the standards proposed for HC and CO emissions from heavy-duty engines. The bill's provisions for heavy-duty diesels, however, need to be greatly strengthened. The emission numbers in the bill for diesel trucks and buses mostly copy the current EPA standards (although in several instances the bill is weaker than the EPA regulations). The EPA standards, however, do not comply even with the requirements of the present Clean Air Act. The present law requires EPA to set truck and bus standards based on the capabilities of the "technological leader." Engines requiring more time to meet these levels are able to stay on the market under nonconformance penalties that provide a financial incentive for rapid compliance. EPA, however, totally ignored this directive for leader-based standards and expressly based its truck and bus standards on the technological laggards. Consequently, the Natural Resources Defense Council, the State of California, the American Lung Association, the Sierra Club, and others have challenged EPA's particulate and NO_x standards in court; a decision is expected soon.

EPA's own analysis shows that the leading truck and bus engines can meet much more protective standards. Leading diesel engine makers have the means to meet or better 0.10 g/BHP-hr for particulate matter, along with a NO_x standard as low 3.0 grams, by as early as 1990. The standards proposed in the bill therefore are far too lax.

A separate, more protective standard should be set for NO_x from gasoline-powered trucks. These trucks could meet a NO_x standard of 1.7 g/BHP-hr. Yet EPA, for no apparent reason, set the standard for gasoline-powered trucks at the far higher level that diesels can meet.

S. 2203 should also include a requirement to convert city buses and other large centrally-fueled fleets to methanol. Equipped with a simple catalytic converter, a methanol-powered bus burns far cleaner than a diesel. NO_x emissions are very low, and particulate matter is virtually eliminated.

Other pollution control measures for vehicles and fuels are absolutely necessary to protect public health and the environment, and should be required by S. 2203. Emissions of fuel vapors when filling up at gas stations are one of the largest contributors to the ozone smog problem. Vapor recovery equipment -- so-called "Stage II" controls -- can be placed on gas pumps. California and the District of Columbia have such controls, and St. Louis and New Jersey have proposed to. Another effective means of controlling these fumes is with a carbon canister and appropriate ducting onboard the car itself (hence the name "onboard controls"). Both measures are very inexpensive: less than a penny a gallon of gas for the one, and $15-25 per car for the other. Both should be required by S. 2203.

In addition, the volatility of gasoline needs to be reduced. Refiners have increased fuel volatility sharply in recent years. This means that more fuel evaporates from carburetors and fuel injectors, producing more ozone smog. A rollback to volatility levels prevalent in the 1970s should be included in S. 2203.

The bill also should be amended to close loopholes in many EPA-approved inspection and maintenance programs. The worst example is EPA approval of an I/M program in Houston, Texas, that amounts to nothing more than a look under the hood.

Mr. Chairman, these motor vehicle and fuel controls, coupled with further reductions from stationary sources, are absolutely necessary to protect public health and the environment. The promise to protect the health and welfare of the American people, made in the Clean Air Act 16 years ago, has yet to be fulfilled. S. 2203 is a strong start towards fulfilling the promise. The National Clean Air Coalition will work with you and the committee to improve and pass this bill.

TESTIMONY BY

ROGER A. STAPF
CATERPILLAR INC.

BEFORE THE
SENATE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
WASHINGTON, D.C.

September 26, 1986

Mr. Chairman, I am Roger Stapf, Chief Engineer of Engine Division Engineering, for Caterpillar Inc. Caterpillar is a major manufacturer of earthmoving and materials handling equipment and heavy-duty diesel engines used in both on-highway trucks and off-highway equipment. We very much appreciate this opportunity to comment on the heavy-duty mobile source provisions of the pending acid rain control bills.

Off-Highway:

The extension of heavy-duty truck emission standards to non-vehicular applications is of particular concern to Caterpillar. We believe the regulation of engines used in off-highway machinery is unnecessary and should be deleted from S. 2203.

A review of the scientific data indicates little, if any, impact on air quality from off-highway equipment. A California study, completed in 1982, of farm, construction, and industrial equipment concluded that their emissions' contributions were insignificant. The attached pie chart, illustrating 1983 EPA data, shows a contribution to acid rain in the Northeast of slightly more than 1 percent. And a 1984 Office of Technology Assessment (OTA) report concluded that the extent to which hydrocarbons (HC) and oxides of nitrogen (NO_x) from all mobile sources contributed to acid rain was "uncertain."

Aside from the question of environmental need to control off-highway vehicle emissions, there is the matter of technological feasibility.

There appears to be an assumption that engines used in off-highway machinery are similar or identical to on-highway truck engines. This simply is not true. There is a wide range of diesel engines varying in displacement, number of cylinders, methods of aspiration, horsepower, rpm and torque. For example, Caterpillar's product line includes over 100 models of construction machinery using 22 different engine models in the 60 to 1600 horsepower range. Only four of these 22 engine models even resemble truck engines.

Engines in construction machines operate differently from truck engines. Engines in earthmoving equipment are required to simultaneously move the machine while providing power for a variety of tasks such as digging, lifting, pushing, and pulling at varying speeds and in differing terrain. Compare this to a truck engine solely responsible for powering a rig over the highway.

In addition to the questionable ability to transfer truck emissions control technology is the lack of a suitable test to determine off-highway engine emission compliance. The current transient test, specifically developed for on-highway truck engines, does not apply to construction machinery engines. New tests, new test facilities and equipment would be required.

Imposing a costly emission control program on off-highway equipment would severely strain an industry already weakened by years of economic slowdown without providing any significant impact on controlling acid rain.

On-Highway Engines:

Turning now to the on-highway diesel engine provisions of the legislation. The emission standards proposed in S. 2203 are far more stringent than those adopted by EPA. The hydrocarbon (HC) and carbon monoxide (CO) levels represent 58 percent and 89 percent reductions from the already achieved levels mandated by the Clean Air Act. Requiring these levels of reduction ignores the trade-offs inherent in engine technology -- that reducing one pollutant jeopardizes the ability to control another. These trade-offs are acknowledged by the EPA in its recent rulemaking and recognized by this Committee in 1981 when it endorsed simultaneous standards-setting for NO_x and particulates.

When S. 2203 was introduced, supporters of the bill indicated it would require emission levels attainable today using existing technology. However, the questionable methodology used to determine these standards ignores the fact that any single engine at the 25th percentile for one pollutant is not necessarily at or below the 25th percentile for another one. In fact, none of the 58 engines surveyed is capable of meeting all four pollutant standards simultaneously.

Other provisions of the pending legislation are equally troublesome. Eliminating EPA's ability to temporarily revise or change standards compromises the agency's ability to set technology-forcing standards without unreasonably burdening engine and vehicle manufacturers.

Removal of the four-year lead time is inappropriate and appears to contradict the previous Committee endorsement acknowledging need for sufficient time for R & D and tooling changes.

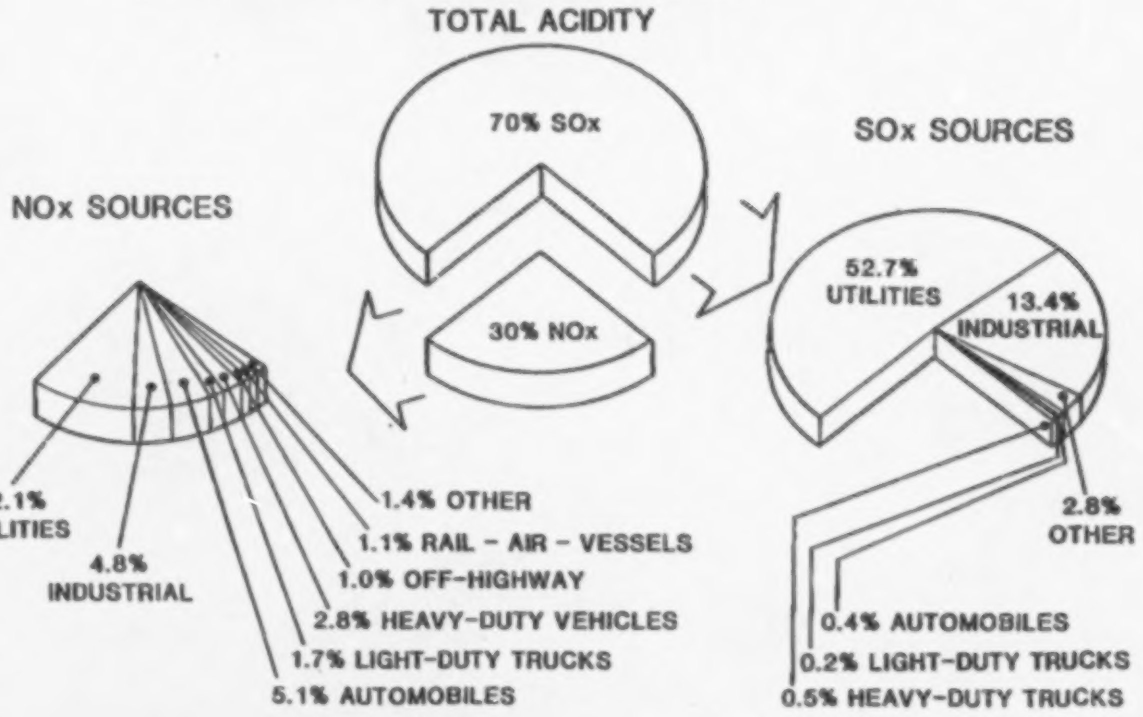
And the change in the Acceptable Quality Level (AQL) from 40 percent to 10 percent would require manufacturers to comply with "effective standards" far beyond current and projected technology capability.

Mr. Chairman, there is one issue about which we agree. We believe it is essential that the sulfur content in diesel fuel be reduced to a level of 0.05 percent by 1990 to enable engine manufacturers to comply with 1991 emission standards. Low sulfur fuel would reduce particulates and SO_2 emissions from existing engines, enable a wider variety of particulate trap technology, and improve engine durability. We believe this should be done within the rulemaking process and Caterpillar continues to discuss with EPA the critical importance of commercially available low-sulfur fuel in time to complete our engine development and certification work.

In summary, we believe the existing authority of the Clean Air Act does provide the necessary framework to regulate heavy-duty diesel engines. The current EPA regulatory program -- imposing strict emission levels on trucks through the mid-1990s -- is a technology-forcing and costly program severely challenging heavy-duty engine manufacturers.

I'll be pleased to answer any questions.

MAN-MADE CONTRIBUTIONS TO ACID RAIN
IN THE NORTHEAST REGION



DATA SOURCE: 1983 NATIONAL EMISSIONS REPORT, NATIONAL EMISSIONS DATA SYSTEM, ENVIRONMENTAL PROTECTION AGENCY, EPA-450/4-85-013, PB86-114659, DECEMBER 1985

Response
to the Senate Committee
on Environment and Public Works
on Legislative Proposals to Curb
Acid Deposition

Submitted by
Cummins Engine Company, Inc.
September 26, 1986

My name is Paula Gustafson. I am the Product Environmental Management Director of Cummins Engine Company. We thank you for the opportunity to appear before your Committee to summarize our major concerns with the Senate acid rain bills.

Cummins Engine Company, Inc., headquartered in Columbus, Indiana, is one of the leading worldwide manufacturers of diesel engines. We supply engines and components for heavy-duty truck, construction, marine, industrial, and defense markets.

I will be focusing on 3 issues with respect to bills S.2200 and S.2203 as they apply to heavy-duty engines. These issues are: 1) proposed emissions standards, 2) sulfur content of diesel fuel, and 3) 10% acceptable quality level.

Specific standards for heavy duty engines or vehicles should not be included in the Clean Air Act.

In the 1977 Clean Air Act Amendments, Congress established a framework or process for setting emissions standards for heavy-duty engines or vehicles. Congress set forth this process in sections 202 (a)(3)(A)-(E).

This process:

1) Establishes a repetitive, periodic mechanism for setting and modifying heavy-duty standards. The 4 year lead time requirement reflects recognition of the technology and product development cycles in the industry.

2) Establishes percent reduction target standards as a starting point for regulation, but authorizes and encourages EPA to establish underlying target standards based solely on health and welfare criteria.
3) Permits EPA to establish temporary standards ("revised standards") that are less stringent than the underlying target standards because of technological infeasibility, excessive cost, or undesirable trade-offs among pollutants or trade-offs with other national objectives.
4) Directs EPA to gather, evaluate and incorporate into this process new evidence relevant to standard-setting. Using this information, EPA may permanently change the underlying target standards, making them more or less stringent, and may further revise the temporary standards.

S.2203 would change this framework by writing into the statute specific and rigid standards reflecting concerns about the possible adverse effects of acid deposition. The current law allows EPA to take full account in the standard setting process of the evidence on the possible health and welfare threat posed by acid deposition as well as by other pollutants and yet retain the flexibility to modify standards in the future to reflect new evidence on these and other threats without waiting for Congress to act.

Under the standard-setting process, every three years EPA is required to report the results of an ongoing pollutant specific health effects study and, based on this and other information it may change the underlying target standards. In accordance with this process, Congress might direct EPA to consider the health and welfare evidence on HC, CO, and any other pollutant of concern and to make a determination, with a report to Congress, whether the evidence warrants standards different from those currently promulgated for 1991, and if so whether they would be technologically feasible "without increasing cost or decreasing fuel economy to an excessive and unreasonable degree".

S.2203's proposed heavy-duty emissions standards are technologically infeasible. They ignore the technological trade-offs between controlling HC and NO_x. There is no showing that they are necessary to protect health or welfare. The rationale for their selection is flawed. Moreover, it would be inappropriate to extend on-highway standards to off-highway equipment.

EPA's pending 1991 heavy-duty NO_x and particulate standards may well exceed the limits of technological feasibility in that timeframe. These pending 1991 EPA standards assume current HC and CO standards. S.2203's proposed HC and CO standards, which represent emissions reductions of 58% and 89% respectively compared to the current standards, which are 90% reductions from the unregulated baseline, might themselves be technologically infeasible. Because of the control trade-offs between NO_X and HC/particulates/CO, the much more stringent proposed HC and CO standards, even if achievable, would make attainment of the 1991 NO_X standard much more difficult, if not impossible.

It appears that the proposed standards were determined by rank ordering values of each emission constituent in the 1986 EPA certification data for heavy-duty engines and then selecting for each pollutant the value at approximately the 25th percentile from the lowest value. This determination process is badly flawed. Since it was done separately for each pollutant instead of rank ordering engines, S.2203's proposed standards do not represent the 75th percentile of engine control capability. Not one of the 58 engines represented by the EPA certification data is capable of meeting the proposed standards which are well beyond the capability of any engine in the data set. These standards ignore the inherent trade-offs in emissions formation which occur during combustion.

The standards prescribed for on-highway engines are not applicable to off-highway and stationary applications. The duty cycles of diesels for off-highway equipment and stationary applications are vastly different than for on-highway applications. Emissions of off-highway diesel equipment have an insignificant effect on ambient air quality. The application of S.2203's proposed standards to off-highway applications should be deleted.

Specific levels for sulfur content of diesel fuel should not be included in the Clean Air Act.

S.2203 amends section 211 of the Clean Air Act by adding a subsection prohibiting the sale for use in motor vehicles of diesel fuel with a sulfur content in excess of the average content of gasoline sold in the U.S. in 1985, and directing EPA to take certain steps to that end.

Cummins supports the bill's objective to reduce the sulfur content in diesel fuel for the following reasons:

1) The sulphur in diesel fuel contributes to both primary and secondary airborn particulates.
2) Reductions in diesel fuel sulfur content will directly reduce atmospheric particulate pollution and acid deposition associated with the formation of secondary particulate matter.
3) The development testing of trap oxidizer control technology, a technology which is probably essential to meeting EPA's 1991 particulate standards for

> heavy-duty diesel engines, indicats sulfur in diesel fuel contributes to trap plugging and accelerated engine wear. Lowering the sulfur content would reduce primary particulate matter, thereby reducing trap plugging potential, enhancing the prospects for an effective and efficient trap, and reducing engine wear.

While we support the reduction in the sulfur content of diesel fuel, we do not agree that this be done by setting the standard in the Clean Air Act. We urge that the Committee direct EPA to institute a rulemaking to set a fuel sulfur standard pursuant to the authority and criteria in section 211, effective not later than January 1, 1990.

Specific acceptable quality level should not be included in the Clean Air Act.

Cummins believes the 10% Acceptable Quality Level (AQL) for production line testing of engines as proposed in S.2200 should not be adopted. EPA has promulgated regulations establishing a Selective Enforcement Audit (SEA) program beginning with model year 1986 heavy-duty engines. The SEA is an assembly-line testing program to ensure that production engines in each certification family meet the emissions standards.

An element of the SEA is the AQL which refers to the percentage of engines in a family that must meet the standards to pass the SEA. The current 40% AQL ensures that engines within each family, as they leave the production line, will on average be at or below the standards.

To be assured of passing an SEA under the current 40% AQL, manufacturers set design target levels for each regulated emissions parameter well below the standard to take into account inherent variability in measurement processes, manufacturing processes and ambient conditions in laboratories and test cells. As emission standards become more stringent, and they will as promulgated by EPA for model years 1988 and beyond, the impact of such variability on the engine development process becomes greater. Application of a 10% AQL coupled with this uncertainty would *de facto* produce even more stringent standards. The 1991 standards already promulgated are beyond the current technological capability of the engine manufacturers. If more stringent standards are deemed necessary for health based reasons, EPA, through the standard setting process, should set them directly, as opposed to Congress setting them indirectly through a 10% AQL.

This completes our testimony. I would be pleased to try to answer any questions.

STATEMENT OF
NAVISTAR INTERNATIONAL CORPORATION

ON

HEAVY-DUTY ENGINE EMISSIONS PROVISIONS

OF

PROPOSED ACID RAIN LEGISLATION (S 2200 AND S 2203)

SUBMITTED TO THE
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
UNITED STATES SENATE
WASHINGTON D.C.

FOR THE RECORD OF THE HEARING HELD ON
SEPTEMBER 26, 1986

Navistar International Corporation offers the following additional comments on the provisions of S 2200 and S 2203 that would affect heavy-duty diesel engine emissions standards. These comments are designed to amplify and complement the testimony given by James C. McCandless, Navistar's Vice President, Engine Engineering, at the hearing on acid rain legislation held by the Senate Environment and Public Works Committee on September 26, 1986.

INTRODUCTION AND SUMMARY OF COMMENTS:

Navistar is the leading manufacturer of medium- and heavy-duty trucks in North America, as well as a major producer of light-heavy-duty and medium-duty diesel engines. Its mid-range diesel engines, the 400 Series and the 9.0 Liter, are used in its own medium- and heavy-duty trucks. Its smaller 6.9 Liter light-heavy-duty engine is used in Ford's heavy-duty pickups and vans as well as in Navistar's medium-duty trucks.

As a member of the Engine Manufacturers Association (EMA) and the Motor Vehicle Manufacturers Association (MVMA), Navistar fully supports the EMA and MVMA positions that the heavy-duty mobile-source provisions of S 2200 and S 2203 should be dropped. These provisions are unnecessary because the contribution of heavy-duty engines to the acid rain problem is extremely small and because the Environmental Protection Agency has used its existing statutory authority to push the heavy-duty engine industry up to--and possibly beyond--its technological limits. A copy of the EMA position paper on the heavy-duty mobile source provisions of S 2203 and S 2200 is attached as Attachment A.

More specifically, Navistar's comments on the issue of further controls of heavy-duty diesel engine emissions are the following:

1. The contribution of heavy-duty engines to acid rain is extremely small.
2. Specific numerical standards (such as those in S 2203) should not be included in the Clean Air Act.
3. The 10% Acceptable Quality Level (AQL) for production-line testing of engines (proposed in S 2200) would increase the stringency of currently promulgated EPA standards far beyond the technological capability of the industry.
4. Lengthening the current statutory definition of "useful life" (proposed in S 2203) could also drastically increase the stringency of the heavy-duty engine standards proposed in S 2203.
5. While Navistar favors mandating the reduction of sulfur in diesel fuel by January 1, 1990, this can be done through use of EPA's existing statutory authority, except for middle-distillate fuels for non-highway use.
6. Claims that diesel particulates pose a risk of cancer in human beings are based on questionable methods and represent an exaggeration of what has been established according to recognized scientific research.

THE CONTRIBUTION OF HEAVY-DUTY ENGINES TO ACID RAIN IS EXTREMELY SMALL:

According to the latest EPA emissions data (the 1983 National Emissions Report published in December 1985), out of all emissions that could be connected to acid rain in the Northeast, sulfur oxides account for about 70%

and nitrogen oxides 30%. All transportation sources contributed only 1.6% of the sulfur oxides, and 11.7% of the nitrogen oxides. Heavy-duty vehicles contributed 2.8%, or less than one fourth, of the 11.7%. Also, because new EPA NOx standards promulgated in 1985 will become effective in 1988 and 1991, it can be expected that the contribution of heavy-duty engines to total nitrogen oxides emissions will be cut in half during the next decade.

Not only are heavy-duty engines a miniscule part of the emissions problem; it is also questionable whether those emissions that do occur are actually contributing to acid rain. Heavy-duty engine emissions occur primarily in urban areas and transportation corridors and are produced at ground level rather than being funneled up into tall smokestacks and dispersed into the atmosphere from great heights. Therefore, the transportation of heavy-duty engine emissions over long distances to the wooded areas of the Northeast (or the West) is not necessarily a foregone conclusion.

WRITING SPECIFIC NUMERICAL STANDARDS INTO THE ACT IS UNNECESSARY AND RISKY:

It has been asserted by representatives of the environmental movement that Congress must write specific standards into the Clean Air Act for heavy-duty engines because EPA has since 1977 failed to promulgate heavy-duty standards that reflected the capabilities of the technological leader. Navistar, in contrast, would argue that EPA's latest heavy-duty standards, the NOx and particulate regulations promulgated in 1985 for 1991 and beyond, exceeded the anticipated technological capabilities of the industry--including the "technological leader," whoever that may be. Examination of the record of the rulemaking proceedings clearly shows that none of the witnesses was willing to claim that technology to meet the proposed standards could be expected to be available in time for manufacturers to meet the standards. Both the environmentalist position and the industry position are embodied in two lawsuits filed in 1986 that challenge the EPA rule.

Far from having been "babied" by EPA, Navistar believes the heavy-duty engine industry has been challenged by EPA to develop new technology rapidly. Engine manufacturers have, in response to EPA requirements and also to customer demands for better engine performance and fuel economy, introduced new technology such as electronic injection systems and charge-air cooling and have expanded the use of existing but costly technology such as turbocharging. The standards already promulgated by EPA represent the lowest emission levels that can be achieved by our industry now and in the future, and they may actually exceed our capabilities, especially in the area of particulate emissions. Heavy-duty emissions are being reduced as fast as the development of technology will allow.

Navistar believes the current heavy-duty framework whereby Congress sets percentage reduction TARGETS while allowing EPA the flexibility to establish, revise and adjust the actual standards numbers based upon technological considerations has generally worked well in the past and should be continued. EPA has set heavy-duty standard levels based upon a thorough review of the level of existing technology and by holding public hearings. When, as in the case of the 1985 NOx and particulates rulemaking, there are disagreements about the standard level, the current system allows both sides to challenge EPA's rule in court rather than being stuck with a rigidly fixed standard.

As an illustration, Navistar is specifically concerned about the impact that statutorily required standards might have on the light-heavy-duty end of the diesel engine business. Navistar has been a leader in providing new engine products in this segment of the market, which has grown considerably in recent years. Truck purchasers have turned increasingly from gasoline engines to diesels to obtain better fuel economy, lower maintenance costs, and greater durability. While the initial purchase price of a diesel is higher, the payback in most applications has, until recently, been relatively short.

However, the 1991 EPA NOx and particulates standards will challenge Navistar's ingenuity. Because these smaller, lighter diesel engines compete directly with gasoline engines, modifications made to reduce emissions must not carry any durability, maintenance, or fuel economy penalty . Nor can they impair the overall performance or increase the price of the engine--especially in this time of reduced gasoline prices. If fuel economy is degraded and engine prices are increased, truck buyers will opt for lower-cost, but much less fuel-efficient, gasoline engines.

Because of these competitive restraints, Navistar will attempt to meet the 1991 EPA standards by changing the design of the engine itself rather than relying on costly and unproven trap oxidizer technology. But light-heavy-duty diesels such as the 6.9 Liter will require a lot more redesign than the heavier engines.

To be more specific, the 6.9 Liter engine will have to be redesigned for direct injection rather than indirect injection and be converted to a mechanically actuated injection system. The engine will also have to be turbocharged. This will mean retooling the engine head and crankcase. The estimated capital cost is $60 million--which represents the amount of profit Navistar expects to earn in 1986. This investment, together with the cost of developing the necessary technology, will raise the cost of producing the engine an estimated 20%. Larger diesel engines already use direct injection and turbocharging and, therefore, will require a much lower capital investment and will experience a lesser product cost increase.

Even if Navistar invests all this money, it has no assurance the redesigned 6.9 Liter engine will meet EPA's 1991 standards for NOx and particulates. But it has a better chance of meeting those standards than it would meeting the standards set in S 2203, which basically would write into law the EPA standards for NOx and particulates, while dramatically increasing the stringency of the hydrocarbons and carbon monoxide standards. In contrast to EPA's current standards of 1.3 grams per brake-horsepower-hour hydrocarbons and 15.5 g/bhp-hr carbon monoxide, S 2203 would require a .54-gram HC standard and a 1.7-gram CO standard. In addition, the actual stringency of these standards would be increased by S 2203's affirmation of the "full-life" definition of useful engine life.

The standards that would be established by S 2203 ignore the tradeoffs inherent in reducing engine emissions. This apparent ignorance of technological reality is reflected in the assertion by the bill's sponsors that 25% of existing heavy-duty engines can meet the standards in S 2203. That statement is simply untrue.

The standards numbers in S 2203 appear to have been derived by rank-ordering from highest to lowest value some certification data for selected models of 1986 heavy-duty engines, and then setting the standard for each pollutant at the 25th percentile above its lowest value. This methodology ignores the fact that an engine at the 25th percentile in one pollutant was not necessarily at or below the 25th percentile in the other pollutants. While 25% of heavy-duty diesel engines certified in 1986 could meet the standard for one pollutant only, none of the 58 engines examined in deriving the S 2203 standards could meet those standards for all four pollutants simultaneously. Also, no particulate emissions were measured for any of the engines examined, which further calls into question any assertions about the ability of these engines to meet all four standards simultaneously.

Navistar understands the concern of the authors of S 2203 that EPA may not be forcing the pace of technology as fast as possible. However, rather than legislating rigid standards that--in the case of heavy-duty engines--are certain to be technologically infeasible, Navistar would suggest that Congress monitor more closely EPA's rulemaking activities--as well as the state of technological progress--by holding yearly oversight hearings. Then, if legislation were truly needed to correct EPA's alleged shortcomings, Congress would have demonstrated that need.

Congress could also make better use of information that is technically available to it under existing provisions of the Clean Air Act. First, Section 202(a)(3)(D) of the Clean Air Act requires EPA to submit reports every three years on the status of emission control technology and the impact of emission controls on public health, cost-effectiveness and fuel economy. These reports would greatly increase Congress's ability to exercise wise oversight--and to judge for itself whether EPA is truly doing its job. To date, EPA has not submitted these reports and Congress has not demanded them.

Second, Section 202(a)(3)(C) of the Clean Air Act calls for reports by the National Academy of Sciences on the feasibility and cost of achieving heavy-duty emissions reductions. One such study was done on NOx in 1981 that was very helpful to EPA and the heavy-duty engine industry, in that it carefully evaluated the emission tradeoff phenomenon and the foreseeable technology available to deal with it. Navistar believes additional NAS reports would be useful to Congress, to EPA, and to the engine industry. They would provide a knowledgable third-party opinion about EPA's efforts to force the development and use of technology. Congress could play a role by requiring further NAS reports to be made.

THE 10% ACCEPTABLE QUALITY LEVEL REQUIREMENT IN S 2200 SHOULD NOT BE ADOPTED:

S 2200 would write into the Clean Air Act the requirement that the Acceptable Quality Level (AQL) for production-line testing of heavy-duty engines would have to be 10%, rather than the 40% currently allowed by EPA. Statistically, this represents a change from the concept that the average engine must pass to the concept that every engine must pass. This proposal was included in the heavy-duty HC and CO standards EPA proposed in 1979, but was withdrawn from the rulemaking in 1983 after the engine manufacturers demonstrated that the proposal would increase the stringency of the proposed standards well beyond their technological capabilities.

The AQL requirement plays an important role in determining the actual stringency of the standard that must be met by each engine that comes off the production line. Under the Clean Air Act, manufacturers must certify that engines will be under the promulgated standard levels. In addition, they must certify that the engines will meet these standards throughout the useful life of the engine, taking into account the inherent tendency of most engine emissions to change or deteriorate as the engine gets older. This means that the engines must be designed to emit fewer emissions when new than the actual standard would require by itself.

On top of that, an AQL requirement that every engine must meet the standard on the production line further lowers the emission level that the engine must meet upon certification. This is because variabilities in manufacturing engines on the production line occur despite manufacturers' constant efforts to control variations from the norm, and because current testing methods produce considerable variation in results, especially for hydrocarbons and particulates. This certification level, taking into account both emissions deterioration over time and manufacturing and testing variability, is known as the "production target level" or PTL. In general, moving from a 40% to a 10% AQL will increase the stringency of any given future heavy-duty diesel engine standard by one half to two thirds, depending on the degree of production-line variability. That means that even if no other changes in heavy-duty diesel engine standards were made, passage of S 2200 would at least double the stringency of the promulgated standards.

The situation would be even more alarming if S 2200's 10% AQL requirement were combined with the heavy-duty standards and useful-life requirements in S 2203. Navistar estimates that, if this were to occur, the PTLs would be as low as 3.18 grams NOx, .08 gram particulates, .25 gram HC, and .88 gram CO for the heaviest diesel engines. This compares to S 2203's standards of 5.1 grams NOx, 0.25 gram particulates, .54 gram HC, and 1.7 grams CO. A table explaining the derivation of these PTLs is appended to the end of these comments as Attachment B. These emissions levels are far beyond the technological capabilities of the heavy-duty engine industry, now or in the foreseeable future.

THE CURRENT "USEFUL LIFE" DEFINITION SHOULD NOT BE CHANGED:

Section 202(d) of the Clean Air Act defines the periods of time and mileages for which manufacturers must certify their engines will comply with emissions standards. Section 202(d)(1) defines this period for light-duty vehicles as five years or 50,000 miles, whichever occurs earlier. Section 202(d)(2) defines this period for any other motor vehicle or engine as "a period of use set forth in paragraph (1) unless the Administrator determines that a period of use of greater duration or mileage is appropriate."

In the case of light-duty vehicles the legislative history of the Clean Air Act shows that Congress recognized that the 5-year/50,000-mile definition was equivalent to one half of the useful life of the typical passenger car, intending that manufacturers would be required to certify emissions performance over one half of a vehicle's useful life.

EPA, in proposing its first heavy-duty engine emissions rule under the 1977 Clean Air Act Amendments, chose to interpret the language of Section

202(d)(2) to mean that it could require heavy-duty manufacturers to certify their emissions performance over the full life of the typical or average heavy-duty engine, rather than the half life. The manufacturers, on the other hand, interpreted the same language to mean that EPA could choose a longer period of time and mileage as a half-life measurement for heavy-duty engines, but could not require certification over the full life of the engine or vehicle.

In the final rule, promulgated in 1983, EPA reaffirmed its right to impose a full-life useful life definition and established three separate subclasses of heavy-duty diesel engines as defined by their differing useful lives: 8 years/110,000 miles for light-heavy-duty, 8 years/185,000 miles for medium-heavy-duty, and 8 years/290,000 miles for heavy-heavy-duty. At the same time, however, EPA announced its intention not to pursue emissions recalls beyond three quarters of the life of the average heavy-duty engine, and not to require emissions warranties beyond the half-life of the engine.

S 2203 would double the duration and mileage numbers in Section 202(d)(1), to 10 years and 100,000 miles. For heavy-duty engines, the effect would be to render irrelevant future arguments of manufacturers that Congress intended the useful-life definition to be a half-life definition. It also would raise the possibility that EPA would have to reconsider its decision not to apply the full-life requirement across the board, i.e. to recall and warranty requirements. In addition, because EPA's useful-life time periods for heavy-duty engines are eight years, rather than 10, manufacturers' liability would be increased for low-annual-mileage vehicles beyond the full useful life periods EPA deemed necessary and proper.

As the engine manufacturers argued during the 1979-83 rulemaking, such a change would also raise serious practical problems for warranty and recall. In the case of warranty, application of the full-life concept could require manufacturers to rebuild or replace emission control componentry near the end of an engine's life--which would yield minimal air quality benefits but greatly increase manufacturers' warranty costs. Concerning recall, requiring recall testing at the end of the average full useful life period would be impractical--and at best would yield little, if any air quality benefit--because at that point 50% of the engines would be worn out.

Finally, as stated earlier, due to the inherent deterioration of engines emissions over time and mileage, longer useful-life periods will have the effect of increasing the stringency of the standards. As an example, the impact of emission deterioration factors in lowering the actual emissions levels that manufacturers must achieve at certification can be seen in the above-mentioned illustration of production target levels appended to these comments as Attachment B.

CONGRESS SHOULD ALLOW EPA TO SET DIESEL FUEL SULFUR LIMITS:

Navistar strongly supports the concept embodied in S 2203 that sulfur content in diesel fuel should be limited. Since sulfur in diesel fuel leads to the emission of sulfates and the eventual formation of particulate matter in the atmosphere, reduction of sulfur in diesel fuel will immediately lower particulate emissions from all diesel engines, both new and old.

In addition, reduction of sulfur in diesel fuel will facilitate the efforts of heavy-duty engine manufacturers to develop emission-control technology to comply with the 1991 EPA particulate standards. For some engines, these standards may require use of particulate trap oxidizers. Current development testing of these devices indicates that current levels of sulfur in diesel fuel contribute to trap plugging, increase sulfate formation in catalytic traps, and accelerate engine wear under certain conditions.

Since manufacturers must begin certification testing of 1991 model-year engines in 1990, Navistar supports a requirement that sulfur content be lowered in fuel sold after December 31, 1989. California's Air Resources Board is already phasing in requirements for use of low-sulfur diesel fuel in the South Coast Air Basin (Los Angeles metropolitan area).

At the same time, however, Navistar notes that EPA has already announced its intention to consider controlling sulfur content in diesel fuel in that time frame and will be setting the rulemaking process in motion shortly, using its existing statutory authority (Section 211(c) of the Clean Air Act) to regulate fuels or fuel additives used in motor vehicles or engines. Thus, writing a specific standard and deadline into the law is probably unnecessary. Navistar would suggest instead writing committee-report language that strongly encourages EPA to follow through with its plan to set sulfur-content limits.

Navistar is aware of the petroleum industry's objection that since middle-distillate fuels for stationary sources would not be regulated, this would impose an additional burden on that industry, forcing it to maintain inventories of both high-sulfur and low-sulfur fuel. Navistar suggests Congress could solve this problem by expanding EPA's existing authority to regulate fuels or fuel additives to cover middle distillate fuels for stationary sources.

THE ALLEGED CANCER RISK OF DIESEL PARTICULATES IS NOT PROVEN:

Over the past several years, representatives of the environmental movement have made sweeping accusations about the alleged risk of cancer from diesel particulates. Some credence to these accusations was lent by EPA's "Diesel Particulate Study," issued in October 1983, which summarized the Agency's rationale for believing that diesel particulates represent a carcinogenic risk. This study made a risk assessment by comparing the mutagenic activity of diesel particles with that of other emissions with known carcinogenic effects (cigarette smoke, roofing tar emissions, and coke-oven emissions). EPA used this study in its heavy-duty oxides of nitrogen and particulate rulemaking as an additional justification for the extremely stringent particulate standards set for 1991 and 1994.

Navistar believes these accusations--as well as the EPA study--are based on questionable methods and do not constitute a solid basis for either regulation or legislation. The evidence of cancer risk to human beings from diesel particulates remains unclear and the proof is far from conclusive. Two recent studies indicate that both the 1983 EPA study and recent animal studies cited as evidence confirming the carcinogenic risk of diesel particulates are seriously flawed both in their methodology and their conclusions.

Following EPA's promulgation of a final heavy-duty NOx and particulates rule on March 15, 1985, the Engine Manufacturers Association and the Motor Vehicle Manufacturers Association hired the Environ Corporation, a Washington, D.C. risk assessment consulting firm, to analyze the risk assessment methodology of the 1983 EPA "Diesel Particulate Study". The result was a report, "Detailed Analysis of Procedures Used by EPA in Their Risk Assessment of Diesel Particulate Emissions," released in June 1986. A copy of the Executive Summary of this report is enclosed with these comments as Attachment C.*

The Environ Corporation analysts found that questionable methods were used to make the risk assessment. Ironically, they found that the basic premises used in arriving at the risk values were not accepted by any reputable scientific organization--including EPA's own experts in this field. Examples of poor scientific methodology included:

*The assumption, crucial to the logic of the entire EPA study, that relative mutagenic activity (Ames testing) of complex chemical compounds such as diesel particulates can be used to estimate their carcinogenic potential in human beings.

*The assumption that the diesel particulates used as evidence in the study were representative of diesel particulates emitted by typical production-line heavy-duty engines. In fact, the EPA study relied on samples from only one heavy-duty diesel engine, a prototype engine which even its manufacturer agreed was not representative of real-world emissions.

*The assumption that only the benzene-soluble extractable fraction of particulate emissions is responsible for carcinogenic effects. There is no reason to rule out the role of gaseous and unextracted particulate components of emissions when they are also present in the sample.

*The assumption that the emissions that workers were exposed to in the EPA tests were the same emissions that were used in the Ames testing samples.

*The selection and omission of data. EPA's study ignored certain data sets, both biological and chemical, that did not support its case, while manipulating the data sets it did use in occasionally unorthodox ways.

The Environ analysts summarized their findings in this manner:

> We nevertheless conclude that the approach to risk assessment used by EPA, while creative in concept, has failed in its execution to meet the scientific standards customarily accepted for assessing carcinogenic risk, such as those outlined by EPA itself in its proposed guidelines for risk assessment, those of the Office of Science and Technology Policy, or those of the National Academy of Sciences. For these reasons, we judge the risk estimates provided for diesel emissions insufficiently reliable to form the basis for regulation because of the unrepresentativeness of the diesel emission samples tested, and the lack of validation of the novel risk assessment procedure used, particularly in light of the substantial differences in chemical and physical composition of the various emissions examined.

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*Attachment C has been retained in committee files.

Navistar also believes there is reason to question the claims that have been made that recent whole-animal studies confirm the carcinogenic risk of diesel particulates. In July 1986, Dr. Jaroslav Vostal, a researcher at the General Motors Research Laboratories, Warren Michigan, delivered to an International Symposium on Toxicological Effects in Tsukuba Science City, Japan a paper entitled "Factors Limiting the Evidence for Chemical Carcinogenicity of Diesel Emissions in Long-Term Inhalation Experiments." This paper analyzes data sets from the Fraunhofer Institute, Lovelace BioMedical and Environmental Research Institute, and Battelle-Geneva that have been cited by at least one other witness in these hearings as evidence pointing to the cancer-causing risk of diesel particulates. A copy of this paper is enclosed as Attachment D.

In all of these studies laboratory rats were exposed to diesel particulate concentrations of 350 to 7,000 micrograms per cubic meter for extended periods of time. Yet EPA, in the 1983 "Diesel Particulate Study," estimated that even under the worst-case scenario the average exposure of the U.S. population to diesel particulates would be no greater than 5.4 micrograms per cubic meter. Also, as Dr. Vostal noted, tumors were only found at the highest exposure levels and then only in animals that had been exposed for 24 months, near the end of their normal life span.

When Dr. Vostal analyzed the frequency of tumors at various cumulative administered doses of particulates, he found a threshold level of 10,000 milligram-hours per cubic meter below which no tumors were formed. Reasoning that if the cause of the tumor formation were genetic in nature there would be no threshold (i.e. tumors would begin to occur at any dose level), Dr. Vostal hypothesized instead that the tumor formation in these tests resulted not from genetic damage but from the effect of accumulated particulates retained in the lungs. As evidence he cited the fact that the animals began to form tumors after they had retained a threshold level of 6 to 7 milligrams per cubic meter in their lungs. As a verification of this hypothesis, Dr. Vostal noted that studies of laboratory animals exposed to inert particles (those with no organic compounds attached) showed tumor formation threshold levels of 30,000 milligram-hours per cubic meter.

Dr. Vostal concluded from this analysis that, since the data sets showed a threshold level of tumor formation, the chemicals attached to the diesel exhaust particles may not invade cells and cause genetic changes, but instead may cause cancer through the irritating effects of large concentrations of particles:

> The analysis of the relationship between the delivered dose of particles and the response have shown that the frequency of tumors in laboratory rats exposed to high concentrations of diesel exhaust correlates with the particles deposits in the lung. However, it is difficult to evaluate whether this action should be considered as evidence for carcinogenic action of particle associated chemicals. The primary question is how the long-term inhalation bioassays should be interpreted. Are the tumors the outcome of hydrocarbons adsorbed on the surface of the particles and interacting with the genetic material in the adjacent cells, or is the production of tumors merely an unspecific irritating effect of the

> accumulated foreign material in contact with the sensitive cells of the respiratory system?
>
> Obviously, additional research data are needed to validate or disprove this proposed mechanism. In addition, we must elucidate the potential role of many other involved factors such as limited bioavailability of particle-associated organics, cellular-defense systems in the lung, or nutritional vitamin deficiencies before definitive conclusions on the mechanisms responsible for the observed lung tumor production can be drawn. The experimental evidence accumulated to date shows that the action of particles is mediated primarily by the epigenetic mechanism of carcinogenesis, can be characterized more by promotional than by the initiation stages of carcinogenic process, and probably does not involve primary damage to the genome. The threshold character of the diesel particles' action observed in the long-term inhalation experiments, as well as the fact that the particle-induced lung tumors are restricted to only one species, indicate already now that the animal results cannot be directly extrapolated to low ambient air exposures or used in assessment of human risk.

Navistar would emphasize that Dr. Vostal's analysis also shows that, far from proving that diesel particles constitute a serious cancer risk, these whole-animal studies prove only that diesel particles--as well as inert particles--may promote cancer in rats if the total particulate burden is high enough. In these studies, the exposure levels were two orders of magnitude above the potential peak exposure expected in urban atmospheres due to the vehicular use of the diesel engine--up to 7,000 micrograms per cubic meter compared to 7 or 8 micrograms per cubic meter.

CONCLUSION:

In conclusion, Navistar recommends the following actions by the Environment and Public Works Committee concerning S 2203 and S 2200:

1. All references to heavy-duty engines standards and requirements should be deleted from S 2203 and S 2200.

2. The useful-life definition in Section 202(d)(1) of the Clean Air Act should not be changed.

3. Congress should reaffirm its intention to exercise close oversight over EPA's regulation of heavy-duty engine emissions, including holding annual hearings on technological progress and emissions levels, and requiring reports from both EPA and NAS.

4. Congress should state clearly its intention that EPA move quickly to regulate the sulfur content in diesel fuel.

Navistar shares the Committee's concern that the quality of the nation's air be improved to the greatest possible degree. Navistar is working as diligently as possible to achieve this goal, and will continue to do so in the future.

ema Engine
Manufacturers
Association

One Illinois Center
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ATTACHMENT A

THE ENGINE MANUFACTURERS ASSOCIATION
POSITION STATEMENT
ON
HEAVY-DUTY MOBILE SOURCE PROVISIONS OF ACID RAIN LEGISLATION
(S. 2200 AND S. 2203)

I. ON-HIGHWAY ENGINE EMISSIONS STANDARDS AND REQUIREMENTS

EMA believes the statutory requirements for heavy-duty mobile source emissions should not be modified as proposed in these bills and that all references to heavy-duty mobile source emissions requirements should be deleted from S. 2200 and S. 2203.

A. Specific standards should not be included in the Clean Air Act.

Rationale:

*Including these specific standards in the Act ignores the tradeoffs inherent in engine technology in reducing different pollutants simultaneously. Reduction of NOx emissions produces increases in HC and particulates emissions, as well as reducing fuel economy.

*Heavy-duty engine emissions have been regulated since 1970. The Clean Air Act enables EPA to set heavy-duty standards considering technological feasibility and availability, as well as fuel economy and economic impact. This approach to standard-setting makes possible a balance between the technology-forcing goals of the Act and economic and technical practicality.

*Standards effective in 1985 are 1.3 g/BHP-hr HC (for diesels) and 15.5 g/BHP-hr CO. These represent the 90% reductions from the 1969 baseline emissions required by the 1977 Act. In addition, current heavy-duty diesel engines must meet a 10.7 g/BHP-hr NOx standard. EPA recently established, through the rulemaking process, a 6.0 g/BHP-hr NOx standard and 0.6 g/BHP-hr particulate standard for 1988, and a 5.0 g/BHP-hr NOx standard and 0.25 g/BHP-hr particulate standard for 1991. These standards reflect and may even exceed the limits for technological feasibility in that time frame.

*The hydrocarbons (HC) and carbon monoxide (CO) standards proposed in S. 2203 represent additional reductions of 58% and 89%, respectively, in emissions below the already-achieved 90% reductions required by the 1977 Clean Air Act Amendments.

*The standards of 0.54 HC, 1.75 CO, 5.1 NOx and 0.25 particulates appear to have been derived by rank ordering from highest to lowest value some certification data for model 1986 heavy-duty engines, and then setting the standard for each pollutant at the 25th percentile above its lowest value. This methodology ignores the fact that an engine at the 25th percentile in one pollutant was not necessarily at or below the 25th percentile in the other pollutants. In fact, none of the 58 engines examined was capable of meeting all four of these standards simultaneously.

*S. 2203, as drafted, will effectively eliminate the current Clean Air Act provisions allowing EPA to temporarily revise or permanently change standards due to economic or technological considerations. It will also eliminate the requirement that heavy-duty engine manufacturers be given four years' lead time to meet new standards. Thus, S. 2203 will prohibit EPA from exercising the regulatory flexibility currently in the Act. This regulatory flexibility has permitted setting technology-forcing standards without unreasonable burdens on the heavy-duty engine and vehicle industries, and should not be eliminated.

B. The 10% Acceptable Quality Level (AQL) for production-line testing of engines, proposed in S. 2200, should not be adopted.

Rationale:

*Changing the AQL requirement from 40% (the average engine must pass) to 10% (every engine must pass) will dramatically lower the production target level (PTL) of emissions that manufacturers must achieve. Combining this provision with the standards proposed in S. 2203 would result in standards far beyond the technological capability of heavy-duty engine manufacturers within the relevant time frame.

*Currently, production-line testing of heavy-duty engines is aimed at requiring the average of engines to pass, not every engine. Application of the 10% AQL requirement of S. 2200 to the standards of S. 2203 would require manufacturers to achieve PTLs as low as .25 grams HC, .88 grams CO, 3.18 grams NOx, and .08 grams particulates simultaneously. These are the emission levels that prototype and/or certification engines would have to meet in order to increase the confidence that each engine would pass production-line testing and meet the standard through the full useful life of the engine. Such emission levels are far beyond any foreseeable technological capability of the engine manufacturers.

C. The current definition of "useful life" in Section 202(d)(1) should not be changed.

Rationale:

*Lengthening the useful life definition for light-duty vehicles to 10 years and 100,000 miles will require, under Section 202(d)(2) of the Clean Air Act, that all other engines and vehicles meet emissions standards for at least this period -- regardless of their actual full useful life or the fact that Congress previously intended emission compliance to be on a half-life basis.

*In promulgating the 1985 model-year heavy-duty emissions standards, EPA determined the following average full useful lives for the four subclasses of heavy-duty engines by carefully weighing industry, independent, and academic survey data:

Heavy-duty gas, light-heavy-duty diesel	110,000 miles	8 years
Medium-heavy-duty diesel	185,000 miles	8 years
Heavy-heavy-duty diesel	290,000 miles	8 years

S. 2203 would increase the useful-life period for heavy-duty engines from eight to ten years. This would extend manufacturers' liability for low-annual-mileage vehicles beyond the full useful life periods EPA deemed necessary and proper.

*This change will also raise serious practical problems for warranty and recall purposes. Application of this "full useful life" concept to warranty requirements could require manufacturers to rebuild or replace emission control componentry near the end of an engine's life -- which will yield minimal air quality benefits. Similarly, requiring recall testing at the end of the average full useful life period will be impractical -- and at best will yield little, if any air quality benefit -- because at that point 50% of the engines will be worn out.

D. The reduction of sulfur content in diesel fuel should be achieved via the rulemaking process, using EPA's existing statutory authority.

Rationale:

*The 1991 EPA heavy-duty engine particulate standard may require use of trap oxidizers. Current development testing of traps indicates that current levels of sulfur in diesel fuel contribute to trap plugging, increase sulfate formation in catalytic traps, and accelerate engine wear. Thus, a reduction in sulfur content will aid the efforts of heavy-duty engine manufacturers to develop emission-control technology to comply with the 1991 EPA standards.

*EPA already has the statutory power to limit sulfur content in diesel fuel. Currently, Section 211(c) of the Clean Air Act gives EPA discretionary authority to regulate fuels or fuel additives used in motor vehicles or engines. California's Air Resources Board is already phasing in requirements for use of low-sulfur diesel fuel in the South Coast Air Basin.

II. OFF-HIGHWAY EMISSION STANDARDS AND REQUIREMENTS

The regulation of off-highway engines and vehicles is unnecessary and therefore all references to off-highway engines and vehicles should be deleted from S. 2203.

A. Off-highway engines and vehicles produce little, if any, impact on air quality improvement.

Rationale:

*S. 2203, to establish an acid rain control program, extends on-highway heavy-duty truck engine emission standards to off-highway engines and vehicles. S. 2203 also grants the Environmental Protection Agency (EPA) new authority to regulate off-highway engines and vehicles.

*Evaluations of the emissions of off-highway machinery on ambient air quality management indicate little if any impact. A 1981 California study conducted by Environmental Research and Technology, Inc. (ERT) indicated that control of emissions from off-highway equipment would have only a 0.1-5% effect on air quality improvement ... at an equipment cost of .2-12.4% and a fuel consumption increase of 5-15%.

*The 1981 EPA National Emissions Report, National Emissions Data System shows off-highway machinery contributing about 1.0% to NOx emissions, insignificant when compared to other mobile and stationary sources. And the 1984 Office of Technology Assessment report entitled Acid Rain and Transported Air Pollutants -- Implications for Public Policy concluded that the extent to which HC and NOx from mobile sources contributes to acid deposition was "uncertain."

B. S. 2203 erroneously assumes similarity of on-highway and off-highway engine type, size, usage pattern,/function and characteristics.

Rationale:

*The diversity of function, application and size of off-highway machinery results in a wide variety of diesel engines, differing in displacement, number of cylinders, cylinder block configurations, rated horsepower and rated speed. For example, one large manufacturer of construction machines offers 80 models using 17 different engine models. Of these 17 models, only 4 resemble truck engines. Unlike truck engines, most off-highway equipment engines are designed to be part of an integrated vehicle system which includes transmission, torque converter, hydraulics drive train and cooling system. This integrated system leaves very little flexibility in engine modifications or use of other engine models. Off-highway equipment models often are highly specialized machinery, designed for specific work applications. While the major function of a truck engine is to power the vehicle, off-highway equipment engines, in addition to providing self-propulsion for the equipment, provide power for a wide range of loads and work functions such as digging, lifting, pushing, pulling and operating auxiliary equipment. The engine performance characteristics must match the requirements of the equipment and the job to be done.

C. The bill incorrectly assumes the ability to transfer emission control and testing technologies used for on-highway engines to off-highway uses.

Rationale:

*There are several considerations unique to off-highway equipment applications. Since the machines operate at heavy loads, in contact with combustible products, prevention of overheating and fires is important. Emission controls that create high temperatures would be impractical -- and potentially dangerous. Emission controls requiring frequent servicing may not be adequately serviced ... increased downtime, tampering and higher warranty costs could result. And since the capital costs of off-highway machinery preclude any reduction in durability, emission controls that lessen engine or equipment life would be unacceptable to customers.

*The transient test procedure, used by engine manufacturers to assure compliance with EPA on-highway heavy-duty truck emission standards, cannot be used to measure emissions from the broad range of off-highway equipment. The transient test, designed to simulate the operation of an on-highway truck in an urban area, bears no resemblance to the operation of construction equipment. For example, it would be impossible to operate a 1500 horsepower engine on the existing test equipment.

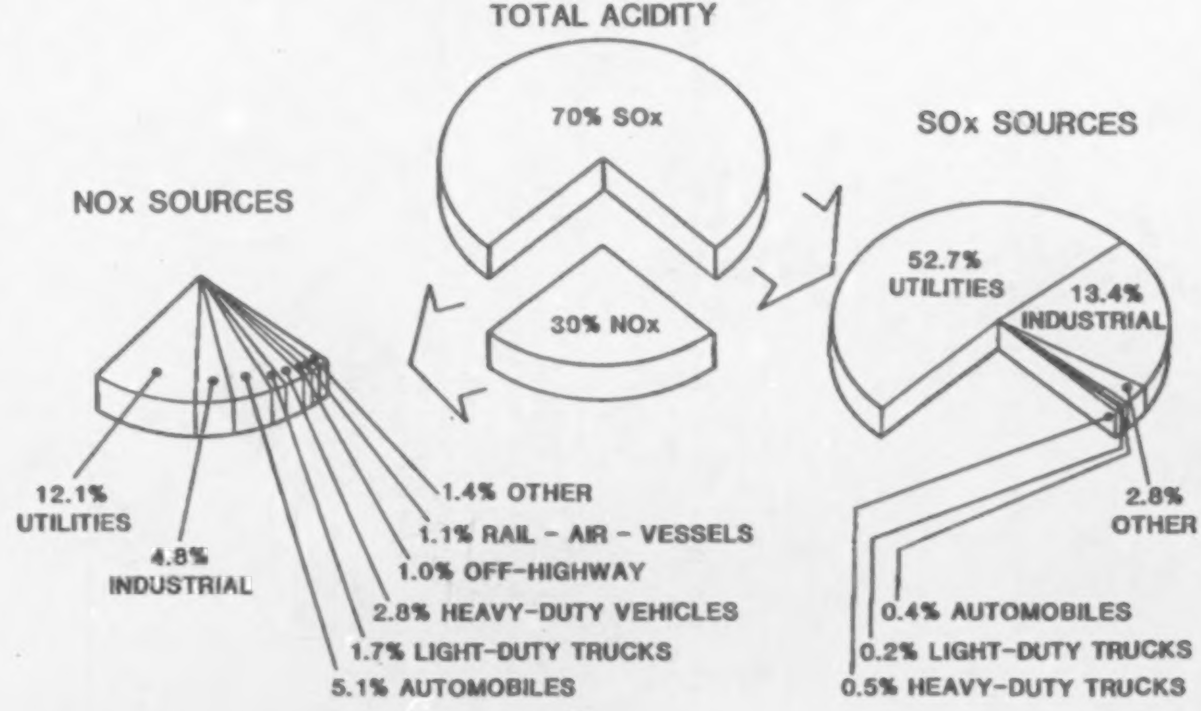
D. This legislative approach is not cost effective given construction machinery's limited contributions to HC, CO, and NOx emissions.

Rationale:

*Sales volumes of a given model of off-highway equipment are extremely small in comparison to on-highway vehicles. Annual sales per model could be less than one hundred units. In contrast, on-highway truck engines are often produced in quantities of tens of thousands of units.

*The off-highway equipment industry reached its peak sales year in 1979 (U.S. Bureau of Census). Analysts indicate that industry shipments are not expected to reach 1979 levels in the near future -- and perhaps never again. These smaller volumes of machines would increase the cost of an emission reduction program on a per engine basis. The imposition of on-highway engine emission standards to off-highway equipment would impose severe economic strain on an already depressed industry.

MAN-MADE CONTRIBUTIONS TO ACID RAIN
IN THE NORTHEAST REGION



DATA SOURCE: 1983 NATIONAL EMISSIONS REPORT, NATIONAL EMISSIONS DATA SYSTEM, ENVIRONMENTAL PROTECTION AGENCY, EPA-450/4-85-013, PB86-114653, DECEMBER 1985

ATTACHMENT B

EMISSION PRODUCTION TARGET LEVEL - PTL

Stafford Bill 1991 Requirements	DF @ Engine Class				Coefficient of	PTL Per Class @ AQL		
Nox Emission Standard	Type	LHD	MHD	HHD	Variation	LHD 40%/10%	MHD 40%/10%	HHD 40%/10%
5.15	ADF	.08	.13	.20	.13	4.20/3.25	4.16/3.22	4.10/3.18
PT Emission Standard								
.255	MDF	1.18	1.30	1.48	.24	.16/.11	.15/.10	.13/.08
.105 (Bus only)	MDF	1.18	1.30	1.48	.24	.06/.04	.06/.04	.05/.03
HC Emission Standard								
.545	MDF	1.04	1.07	1.10	.23	.38/.26	.37/.26	.36/.25
CO Emission Standard								
1.75	MDF	1.09	1.15	1.24	.14	1.31/1.00	1.24/.95	1.15/.88

NOTES: Standard is adjusted to a maximum pass level including round off.

DF (Deterioration Factor) for NOx and PT are based on estimates provided in EMA Response to Particulate Emission and Gaseous Emission Regulation for 1987 MY per Public Docket No. A-80-18. Note more recent data of in-house audit data confirms that these estimates are typical.

DF for CO and HC is based on the average of certification engine family values for 1984 MY and 1985 MY respectively, including all zero values.

ADF = Additive Deterioration Factor

MDF = Multiplication Deterioration Factor (applied to trap or converter forcing emission limits).

Coefficient of Variation is based on production tolerance and within lab and lab-to-lab measurement variation.

PTL at 40% and 10% AQL predicts the production engine emission target to achieve 40% and 10% Acceptable Quality Level at a 90% confidence level based on a preproduction sample measurement of 3.

2414C

STATEMENT OF MACK TRUCKS, INC.

ON

BILLS S2200, S2203, AND S2813

"TO AMEND THE CLEAN AIR ACT"

TO

THE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

Washington, D.C.

September 26, 1986

These statements are provided through C. K. Salter, Chief Engineer of Engine Development of Mack Trucks, Inc. Some of the provisions of these Bills to amend the Clean Air Act will have profound impact on Mack and the entire heavy duty trucking industry. Mack wishes to comment on the mobile source issues in the bills that directly affect our diesel engine product.

Before addressing these issues, however, let me briefly characterize the Mack Company. Mack designs and manufactures trucks for the heavy-heavy duty portion of the industry. These vehicles are commonly referred to as Class 8 trucks, which are defined as those over 33,000 lbs. gross vehicle weight. All of our trucks are powered by premium diesel engines, the vast majority of which are designed and manufactured by Mack. We are the builders of a specialty vehicle compared to the broad heavy duty truck class defined by the Environmental Protection Agency (EPA) for emissions regulations purposes. The EPA heavy duty classification includes all vehicles over 8,500 lbs. GVW, both diesel and gasoline.

PROPOSED EMISSIONS STANDARDS

The proposed diesel standards in S2203; namely, 0.54 g/BHP-Hr HC, 1.75 g/BHP-Hr CO, 5.1 g/BHP-Hr NOx, and 0.25 g/BHP-Hr particulates, taken together are technologically infeasible for Mack to achieve. It is anticipated that some manufacturers may be forced out of the diesel truck engine

PROPOSED EMISSIONS STANDARDS - continued

business if these standards are adopted. Mack does not have the technology to meet the proposed standards, simultaneously, in a single engine configuration.

Furthermore, we are surprised at the methodology utilized in deriving this set of standards because we believe it did not follow good engineering judgement. It is our understanding that the NOx, HC, and CO standards were derived by rank ordering from highest to lowest value the certification data for all 1986 Model Year heavy duty engines and then setting the standard at the 25th percentile above the lowest value. This methodology ignores the fundamental technical realities inherent in attempting to simultaneously reduce all pollutants. For example, reducing NOx increases HC and particulates, and increases fuel consumption. This approach is like asking a pentathlon champion to compete and win against the champions of each of the five athletic events!

As you know, over the years, engine manufacturers have developed some knowledge on reducing pollutants such as NOx and HC and, to a certain extent particulates, even within the constraints of the control tradeoffs noted earlier. However, we have not found any engine related parameter that could reduce CO emission in diesel exhaust to the level which represents a 99% reduction from unregulated engines and as proposed in S2203.

Our recommendation is that Congress should not set numeric emission standards, but rather give guidance to EPA which is better staffed and equipped to properly evaluate the technological conflicts and tradeoffs that occur when any pollutant standard is reduced.

10% AQL REQUIREMENT

Most of the emission control rules and standards are inextricably interwoven as noted earlier. The concept of Acceptable Quality Level (AQL) is no exception. The AQL has a direct effect on achieving the emission standards themselves. In fact, increasing the stringency of the AQL has the same effect as increasing the stringency of the emission standards.

That a 10% AQL has the effect of increasing the stringency of the emission standard is clearly illustrated in the attached figure. It can be observed that in order to meet a standard of .54 g/BHP-Hr HC, with 40% AQL, Mack must develop its engines to a .51 g/BHP-Hr Low Mileage Target (LMT) or mean production level. However, with 10% AQL the LMT must be reduced further to ensure the additional portion of engines also pass the SEA. This is because engine emission variabilities obey the law of normal distribution

10% AQL REQUIREMENT - continued

and have this inherent characteristic. Therefore, the result of a 10% AQL is an increased stringency in the HC standard of .10 g/BHP-Hr. This represents a further 19% reduction in addition to S2203's proposed reduction of 58% from the currently promulgated Regulation!

This also is the reason that the manufacturers unanimously opposed implementation of a 10% AQL when EPA first proposed it for heavy duty engines. Three points were made then that remain true today:

1. The 10% AQL was contrary to the historical "Congressional intent of averaging".
2. The 10% AQL effectively made the HC and CO standards more stringent than the Clean Air Act dictated 90% reduction from baseline.
3. The 10% AQL was inconsistent with the 40% AQL then in effect for the light duty vehicle Selective Enforcement Audit (SEA) program.

Since that first proposal, EPA retracted its position and promulgated the 40% AQL instead.

Obviously, the introduction of a 10% AQL will not provide something for nothing. First, it represents a subversive way to increase the emission standard stringency. And second, it will be at the expense of higher fuel consumption in the case of NOx, poorer vehicle driveability in the case of particulates, and possible elimination of product line in the case of HC or CO depending on the stringency of the standards that are in effect. In the situation of a marginally complying engine, a 10% AQL could force the engine into non-compliance.

We recommend retention of the 40% AQL as promulgated by EPA.

SULFUR REDUCTION

Mack Trucks, Inc., favors the reduction of sulfur content from No. 2 Diesel Fuel for the following reasons:

1. Low sulfur fuel will increase the useful life of particulate traps which are needed to meet the stringent 1991 and 1994 particulate standards.
2. Low sulfur fuel will allow the use of noble metal catalysts which would reduce the ignition temperature

SULFUR REDUCTION - continued

2. of the particulate accumulated in the trap. This should significantly aid the development of the particulate trap regeneration control systems which are absolutely imperative to the success of traps.

3. We acknowledge that low sulfur fuel will tend to improve engine durability.

We recommend that EPA be required to implement a reduced fuel sulfur standard with lead time sufficient for universal availability by January 1, 1991, when heavy duty diesel engine particulate traps will be required.

SUMMARY

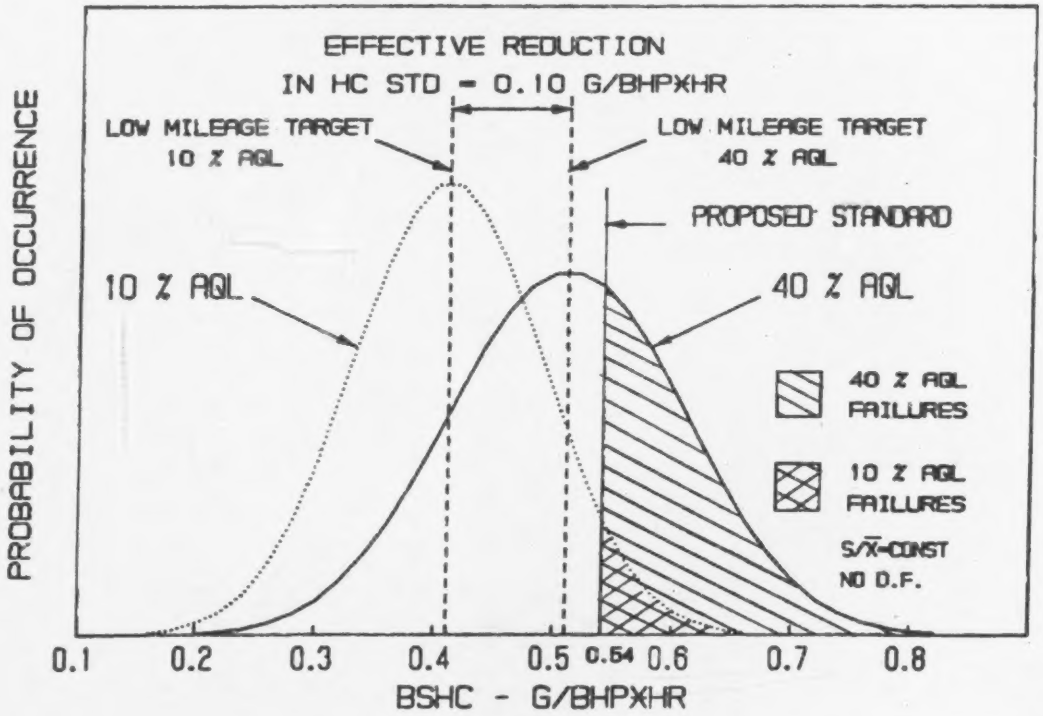
Mack Trucks, Inc., believes that the 1977 Amendments to the Clean Air Act effectively deal with the heavy duty diesel emission problem. We believe there are no reasons for significant further heavy duty diesel engine Amendments. Specifically:

1. Congress should not introduce numeric emission standards into the Clean Air Act. This will retain the flexibility of technological tradeoffs administered by EPA, who is better equipped to set emission standards.

2. The AQL figure should not be altered from 40% as currently promulgated by EPA.

3. We support the reduction of sulfur in diesel fuel, and agree that Congress should require EPA to promulgate a cost-effective sulfur reduction to coordinate with their Particulate standard in 1991.

EFFECTS OF ACCEPTABLE QUALITY LEVEL ON THE VALUE OF THE PROPOSED HC STANDARD



MACK HAGERSTOWN P.05

ACID DEPOSITION, MOTOR VEHICLES AND S.2203

Statement Of

Thomas H. Hanna

President and Chief Executive Officer

Motor Vehicle Manufacturers Association of the U.S. Inc.*

To The

Committee on Environment and Public Works

U.S. Senate

September 26, 1986

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* MVMA represents U.S. automobile, truck and bus manufacturers producing more than 98 percent of all domestic motor vehicles. MVMA members are: American Motors Corporation; Chrysler Corporation; Ford Motor Company; General Motors Corporation; Honda of America Mfg., Inc.; LTV Aerospace & Defense Company, AM General Division; M.A.N. Truck & Bus Corporation; Navistar International Corporation; PACCAR Inc; Volkswagen of America, Inc., and Volvo North America Corporation.

Mr. Chairman, Members of the Committee:

My name is Thomas H. Hanna and I am president and chief executive officer of the Motor Vehicle Manufacturers Association (MVMA).

I am accompanied today by Dr. Richard L. Klimisch, Executive Director, Environmental Activities Staff, General Motors Corporation; Mr. Donald Buist, Director, Automotive Emissions and Fuel Economy Office, Ford Motor Company; Mr. Dietmar Haenchen, Executive Engineer, Vehicle Regulations Department, Volkswagen of America, Inc.; and Mr. Howard B. Padgham, Chief Engineer of Power Train Engineering Operations, Chrysler Corporation.

In the interests of the Committee's time, I shall briefly summarize our views on the mobile source provisions of S. 2203. My fellow panelists will then comment on the impact of the bill from their individual company's perspective. I would like to request that the full text of each of our statements be included in the record of these hearings.

Since the previous panel addressed the heavy-duty truck aspects of S. 2203, my remarks will be directed primarily to light duty vehicles. This however, does not imply any lesser concern on our part with regard to the heavy-duty provisions of the bill.

There are three major questions I would like to focus on: (1) the contribution of motor vehicle emissions to acid deposition; (2) the feasibility of the new exhaust emission standards proposed by S. 2203; and (3) the benefits, if any, that such standards might produce.

Let me begin by addressing the last point, the potential benefit question.

The first chart shows the very substantial progress that has been made in reducing automotive emissions -- more than 90% overall from uncontrolled levels. Because the present levels are so low, the incremental air quality benefits that could be achieved by further tightening would be minimal.

But while the incremental air quality benefits would be small, the task S. 2203 would impose on manufacturers is enormous -- requiring a further reduction of 60-75% of emissions from today's low levels for both passenger cars and light trucks.

Turning to the question of acid deposition, especially in the Northeastern U.S., sulfur oxides (SOx) are considered the major contributor, with nitrogen oxides (NOx) representing roughly 30% of the problem. As the second chart indicates, highway vehicles are a negligible source of sulfur oxides, but are a somewhat greater source of the NOx share of total acidity. Combining both pollutants, the potential contribution of motor vehicles to Northeast acid deposition is limited to only about 10.7% of the total. This is explained in more detail in our full written testimony. Therefore, almost 90% of the acid rain precursors in the Northeast region originate with sources other than cars and trucks.

Furthermore, motor vehicle NOx emissions will continue to decline as passenger cars meeting the existing 1.0 gram per mile NOx standard replace older, higher emitting cars. Because that standard only became fully effective in 1985, most of its benefits are still ahead of us.

In addition, light and heavy-duty trucks will be required to meet new, more stringent NOx standards in the 1988 model year, and heavy-duty engines will have to meet even more stringent NOx standards in the 1991 model year.

On the question of technical feasibility, the fact sheet distributed at the time that S. 2203 was first introduced stated that the "bill proposes that the entire light-duty fleet meet standards now being met by the 25 percent cleanest models." However, an examination of the data reveals, as chart three shows, that while 25% may meet the proposed standard for one individual pollutant or another, only 17 passenger car models -- or 3% of the 574 models tested -- meet _all_ the number values proposed by S. 2203, and no light-duty trucks or heavy-duty gas engines meet all three standards. A manufacturer, however, must certify that its vehicles can comply with the standards for _all three_ automotive pollutants -- HC, CO, and NOx -- to offer a vehicle for sale.

Compounding the problem is the fact that _none_ of the vehicles or engines tested have been shown to meet the proposed standards at the 100,000 mile level also proposed by S. 2203. The doubling of the useful life and warranty duration to 10 years or 100,000 miles virtually doubles the stringency of the standards, and would mean effectively a zero emission requirement.

Finally, even if feasible, tighter motor vehicle standards would impose fuel economy, vehicle hardware and other consumer costs. Individual manufacturers can more appropriately address these points. However, I would note that while additional precious metal content (platinum-rhodium) may improve the catalyst performance slightly, the costs would be high; and are likely to go higher as foreign source metal availability -- from either South Africa or the Soviet Union -- becomes a more significant problem, if not a supply constraint.

In summary, Mr. Chairman, MVMA believes that:

o more stringent motor vehicle emission controls are not warranted at this time; and

o the mobile source requirements proposed by S. 2203 have not been demonstrated feasible and promise little or no environmental benefit while penalizing fuel efficiency and raising consumer costs.

I appreciate the opportunity to present MVMA's views on this legislation which my fellow panelists are now prepared to supplement.

CHART I

PASSENGER CAR EMISSION REDUCTIONS - CURRENT STANDARDS COMPARED TO S. 2203

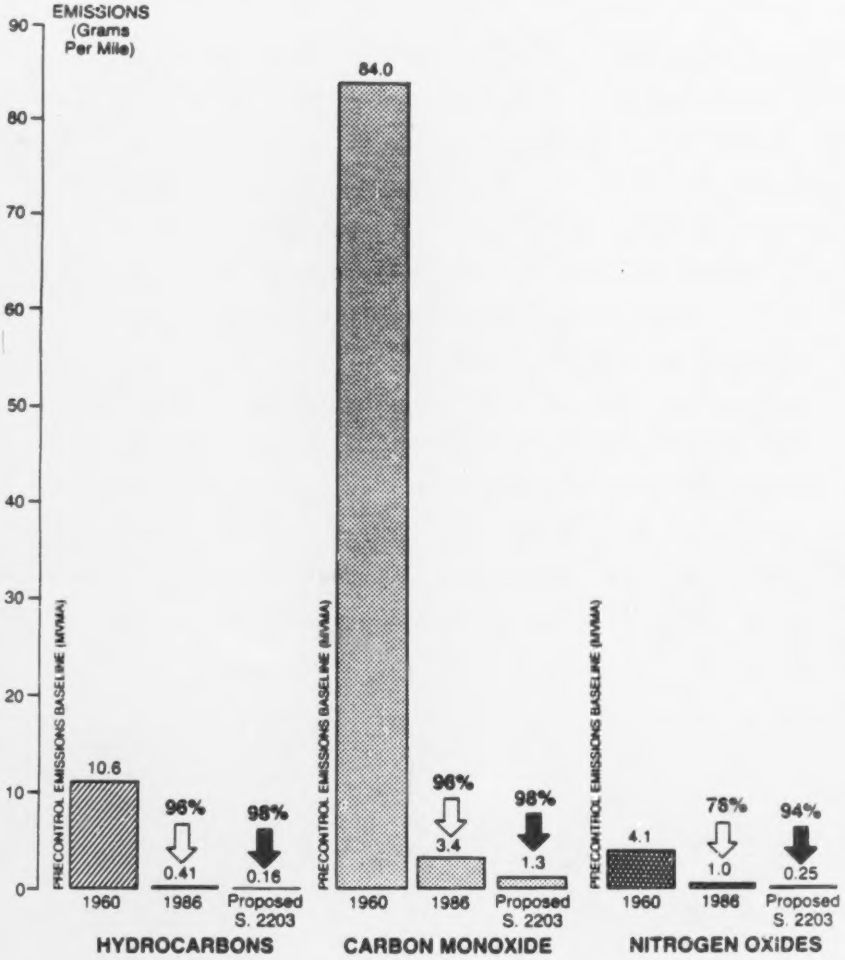
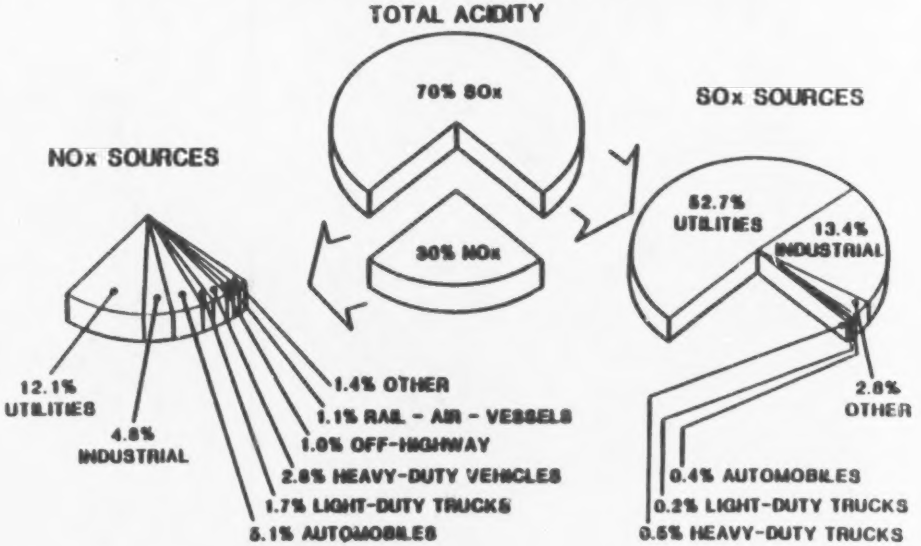


CHART II

MAN-MADE CONTRIBUTIONS TO ACID RAIN
IN THE NORTHEAST REGION



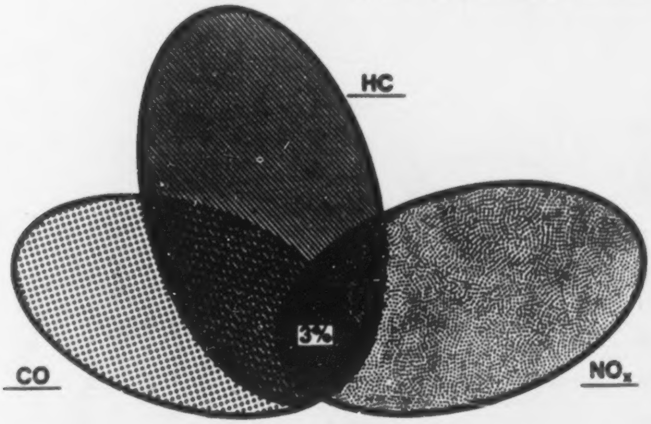
DATA SOURCE: 1983 NATIONAL EMISSIONS REPORT, NATIONAL EMISSIONS DATA SYSTEM, ENVIRONMENTAL PROTECTION AGENCY, EPA-450/4-85-013, PB86-116562, DECEMBER 1985

CHART III

FEW CARS MEET PROPOSED S.2203 STANDARDS AT CURRENT TEST REQUIREMENTS

PERCENTAGE OF 1986 PASSENGER CAR CERTIFICATION TEST RESULT THAT MEET PROPOSED S.2203 EMISSIONS STANDARDS

CURRENT 50,000 MILE CERTIFICATION
TOTAL GASOLINE MODELS TESTED = 574



Key:

HC – 0.16 gpm HYDROCARBON STANDARD – 170 CARS (30%)
CO – 1.3 gpm CARBON MONOXIDE STANDARD – 145 CARS (25%
NO_x – 0.25 gpm NITROGEN OXIDES STANDARD – 163 CARS (28
HC + CO – 56 CARS (10%)
HC + NO_x – 30 CARS (5%)
CO + NO_x – 17 CARS (3%)
HC + CO + NO_x – 17 CARS (3%)

NONE TESTED AT 100,000-MILE CERTIFICATION REQUI

MVMA Response
To Questions From
Senators Burdick and Chaffee

1. As you have noted in your testimony, the American auto industry has achieved dramatic reductions in tailpipe pollution. Can you tell me what emission standards the Canadians now have in effect?

   The present Canadian standards for passenger cars and light-duty trucks are: 2.0 gm/mi HC, 25 gm/mi CO, 3.1 gm/mi NOx. Effective September 1, 1987 (1988 model year) the Canadian standards will be the same as the present U.S. standards. The Ministry of Transport has also proposed to align its heavy-duty engine standards with the U.S. by the end of 1988.

2. Your testimony states that, while you can meet stringent standards as cars/trucks come off the assembly line, the control devices soon begin to decline in effectiveness. Is there data available on, for example, the quantity of NOx being emitted by a five-year old "new" car that orginally met the standard?

   The latest passenger car model year for which five-year operating data is available is the 1980 model year. The NOx standard in 1980 was 2.0 gm/mi. Available data show NOx emission values ranging from 0.19 gm/mi to 6.73 gm/mi based on tests of 584 passenger cars from areas without inspection/maintenance programs. The average NOx emission from this sample was 1.72 gm/mi.

   For light-duty trucks, data are available for a pool of 1979-83 models. The NOx standards for these years was 2.3 gm/mi. Data from the pool of 224 trucks from areas without inspection/maintenance show NOx emissions ranging from 0.80 gm/mi to 6.48 gm/mi. The average NOx emissions from this sample was 1.88 gm/mi.

   It is imporant to note that these levels do not represent a measure of compliance with applicable regulations because the test program included some improperly maintained, tampered, and misfueled vehicles.

3. Your testimony states that the provisions of S2203 would significantly hasten the depletion of rhodium, a rare mineral available only from the Soviet Union and South Africa used as catalyst. Surely, given our tenuous relationships with these two countries, you are conducting research and development on alternate catalysts and/or pollution control devices. What is the status of that research?

   We believe that this question was directed to Dr. Klimisch, General Motors, and he will respond to it in his supplemental remarks.

4. Can you list the cars that comprise the 3% meeting all three S2203 passenger car emission standards?

   There were 13 vehicles that met the proposed numerical standards:

2	AMC
2	Mazda
1	Mercedes Benz
1	Renault
2	Saab
2	Suzuki
1	Toyota
1	Volvo

A review of the 1987 model year certification data indicate that only seven vehicles met all three:

1	Audi
1	Mercedes Benz
1	Mazda
1	Saab
2	Suzuki
1	Volvo

It is important to note that these vehicles had projected 50,000 mile certification levels that fell below the proposed numerical standard of S2203. The bill requires compliance through 10 years or 100,000 miles. None of the above vehicles have demonstrated the capability to meet this much more stringent requirement.

HBW/kd
10/29/86

CHRYSLER
MOTORS

Statement by Howard B. Padgham, Chief Engineer for Powertrain Engineering Programs, Chrysler Motors, before the Committee on Environment and Public Works, for the Hearing on S. 2203, the "New Clean Air Act."
September 26, 1986, Washington, D.C.

Thank you, Mr. Chairman, for the opportunity to comment on S. 2203, which proposes amendments to the Clean Air Act, particularly for the purpose of controlling acid deposition. Chrysler is a member of MVMA and we would first like to endorse the MVMA statement on this bill. In the interest of the Committee's time, I would like to address just three issues: available technology, impact of "in use" vehicle requirements, and leadtime for developing new technology.

Available Technology

Through the years, Chrysler has played a key role in the auto industry's development of the emission control technology needed to meet the requirements of the current Clean Air Act. Although we share the Committee's concern for potential acid rain problems, we believe the standards proposed for HC, CO, and NOx are an inappropriate response. They cannot be met with any technology that we know of, or expect to be able to develop in the near future. If such a technology were to be developed, we would expect it to involve major changes to both the basic engine and the entire emissions control system, which under any circumstance would be a massive undertaking. Furthermore, having to meet these standards for 10 years or 100,000 miles substantially reduces the probability of finding such an effective technology.

Impact of "In-Use" Requirements

Although 3% of all car models are presently certified at levels which would meet the proposed standards, this does not demonstrate that those standards would be technologically feasible once the vehicles were in the customers' hands. Manufacturers must design emission control systems to achieve emission values well below the appropriate emission standards in order to assure that the vehicles will be in compliance with the standards during their entire useful life. This difference between the certification level and the standard represents a built-in safety margin to allow for production variations and any of the broad range of conditions to which vehicles are subjected during their useful life. Without this safety margin, large numbers of vehicles would exceed the emissions standards "in-use" and be subject to recalls, which I might observe, are already occurring throughout the industry even at the present standards.

It is simply a fact of life, because of Murphy's Law if you will, that you always have to aim higher and try harder than should be necessary if you want to insure hitting the target. This means that to meet the standards "in-use," the required certification levels would have to be well below the standards proposed and in fact be near zero -- a clearly unattainable task.

Leadtime for New Technology

Even if technology existed to meet the proposed standards, the planned timing of their introduction would make them virtually impossible to achieve. By way of illustration, at Chrysler we started our emissions durability fleets for the 1988 model year in July of 1985 and expect to finish the data fleet certification testing in December of this year. We will be building advanced pilot vehicles in February of 1987, leading to production in July of 1987. In short, our 1988 model year is already locked in stone. For the 1990 model year we have to start our emissions durability running in November of 1987, which would leave barely a year from today to design and develop as yet unknown technology to meet these proposed standards for 1990 model year. That is simply not realistic.

Conclusion

In conclusion, Chrysler has in the past, and will in the future, remain dedicated to the development of emission control technology necessary to meet the requirements of the Clean Air Act. Consistent with the terms of the Act, however, those control requirements should be environmentally justifiable, technologically feasible, and economically practicable.

* * *

Statement of

General Motors Corporation

to the

Senate Committee on Environment and Public Works

on

S. 2203

Presented by

Richard L. Klimisch
Executive Director
Environmental Activities Staff

September 26, 1986
Washington, D.C.

Mr. Chairman, I am Dr. Richard L. Klimisch, executive director of the Environmental Activities Staff of General Motors Corporation. We appreciate this opportunity to present our views on S. 2203, the "New Clean Air Act."

Before getting into the specifics of the bill, General Motors would like to restate our opposition to the proposed acid rain legislation. Although it has been asserted that acid rain poses a health hazard, there is no convincing case for that assertion in the scientific literature -- a fact acknowledged by EPA. And, although there is evidence of forest damage, recent scientific research suggests that such damage is natural and is caused primarily by factors such as weather changes, drought and insects. Finally, there is good evidence of long-term acidification of lake and stream water, but again the causes and extent of the problem, and the relative contribution of acid rain, are still not known. The evidence that does exist suggests that to the extent acid rain does contribute to surface water acidification, the problem is primarily related to sulfur dioxide (SO_2) rather than oxides of nitrogen (NOx).

The contribution of mobile sources to acid rain must also be put into perspective. We know that acid deposition is attributable to SO_2 and NOx emissions. According to the EPA, sulfuric acids and nitric acids account for about 70% and 30% of the acidity respectively, in the most heavily impacted areas (see Attachment 1).* Automobiles and trucks emit virtually no SO_2, and NOx emissions from these sources account for about 10% of the total acidity in rain, but as we will show,

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* Attachment 1 (chart) has been submitted for the record by a previous witness and therefore does not appear here.

NOx is responsible for a much lower portion of the alleged effects of acid deposition.

Scientific evidence indicates that the nitric acid produced by NOx emissions plays very little role in surface water acidification since the biological utilization process neutralizes any acid that accompanies the nitrate. Since most of the unmanaged ecosystem is nitrogen deficient, the nitrate actually provides a benefit. With regard to trees, there has been speculation that nitrate is responsible for winter damage in some high elevation forests due to over-fertilization, but more recent studies suggest other reasons for the observed die-back. Thus, based on currently available evidence, acid deposition due to NOx is not a major concern, and further tightening of the already overly-stringent NOx standard is not appropriate, especially in light of the significant costs that will be encountered.

The recent U.S.-Canadian agreement to support further research on acid deposition supplements a number of comprehensive research projects that have been started in recent years. Together the results of these projects promise to answer many of the questions surrounding acid rain. Until the boundaries of the problem are better defined, it would be inappropriate to expend great efforts and resources to achieve "solutions" of questionable value. This is why GM believes that new legislation at this time is at best premature and at worst a costly, unnecessary expenditure of resources which, as we will discuss, also could be counter-productive. This testimony will address our specific concerns with the bill.

Although the mobile source provisions are the main focus of this testimony, GM is also concerned about the stationary source provisions of the bill. Many of these would affect our plants directly, and others would increase the cost of electricity used in our business. These provisions of S. 2203 would have an adverse impact on our operations, especially our ability to compete with foreign manufacturers. These concerns will be discussed more fully later in this testimony.

Turning now to the mobile source provisions, General Motors is proud of the progress we have made in reducing motor vehicle emissions. The key to this progress has been the catalytic converter, which was installed on all GM cars beginning in 1975 and is installed on virtually every light-duty vehicle sold in the U.S. today. This device has made it possible for us to achieve 96% reductions in carbon monoxide (CO) and hydrocarbon (HC) emissions and a 76% reduction in NOx, as compared to uncontrolled cars. The result has been dramatic reductions in nationwide vehicle emissions over the years, despite significant growth in both the number of vehicles and vehicle miles traveled.

Furthermore, the improvements in air quality will continue as older, higher-emitting vehicles are replaced with newer, cleaner vehicles. According to a recent EPA presentation (see Attachment 2), passenger car HC emissions will decline from 3.6 million tons per year in 1984 to 2.0 million tons per year in 1995 -- an additional reduction of 44% without new, more stringent standards. And, if we assume that all vehicles meet the current standards, the nationwide passenger car HC emissions would drop to 740,000 tons per year, a reduction of 70%

from 1984 levels. At that level, passenger cars would account for less than 10% of all HC emissions.

The story is similar for passenger car CO emissions. They are predicted to decline from about 33 million tons per year in 1984 to about 17 million tons per year in 1995 -- a drop of nearly 50%. Again, if we assume that all vehicles meet the current standards, CO emissions would drop to 3 million tons per year, a decline of more than 90% from 1984 levels.

As these numbers indicate, there is very little to be gained by further reductions in the standards. The bulk of future emission reductions will come from fleet turnover and from continued efforts to achieve the current standards in the real world. To the extent more stringent standards would cause purchases of new vehicles to be deferred or would divert limited resources away from efforts to reduce excess emissions from vehicles in use, they may in fact, be counterproductive.

Automobile And Light Truck Emissions Standards

The bill would mandate further reductions from current automobile exhaust emission standards of about 61% for HC, 62% for CO and 75% for NOx. These are reductions from current standards, and represent reductions from pre-control levels of more than 98% for HC and CO and 94% for NOx (see Attachment 3).* The reductions from current standards for light-duty trucks would be about 76% for HC, 70% for CO and, for oxides of nitrogen, 58-71% for NOx.

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*Attachment 3 (chart) was submitted for the record by a previous witness and therefore does not appear here.

While proponents of this bill maintain that the proposed standards are already being met by 25% of current vehicles and engines, that claim is based on the erroneous methodology used to establish the proposed standards. The methodology was seriously flawed in at least three areas. First, each emission constituent was evaluated independently, overlooking the unavoidable, inherent interactive trade-offs that occur in controlling various vehicle emissions. Second, vehicle emissions were evaluated at only 50,000 miles, while the proposed standards would require compliance at 100,000 miles. And, third, the vehicles evaluated were all certification vehicles, with no in-use data being considered. Each of these alone is a serious flaw; cumulatively, they will lead to an impossible situation. A more detailed discussion of these flaws follows.

First, using 1986 vehicle certification data, vehicle performance on each emission constituent was examined separately, and the proposed standard set at the level achieved by the best-performing 25% of vehicles in each emission category. Because each emission constituent was examined independently of other regulated constituents, the resulting standards were not ones that could be met by 25% of the vehicles evaluated, but were in fact so strict that only about 3% of these test vehicles simultaneously met all three standards -- hydrocarbon, carbon monoxide and nitrogen oxides (see Attachment 4). *

This result is to be expected. Stricter control over one emission constituent often leads to an increase in emissions of a different type. Thus, it is possible to achieve very low emission levels in one constituent but only at the expense of higher emission levels in another. Independent

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*Attachment 4 (chart) was submitted for the record by a previous witness and therefore does not appear here.

evaluations of each constituent ignore this interactive trade-off and the requirement that all standards must be met simultaneously.

Second, passenger car emissions were evaluated at projected 50,000-mile levels, but the bill would require the standards to be met at 100,000 miles. Deterioration of emission performance with time and mileage appears to be axiomatic although manufacturers continue to work diligently to minimize it. The accumulated thermal aging and cumulative poisoning of the catalyst by impurities in gasoline and oil reduce its effectiveness over time and cause vehicle emissions to increase. Thus, there is simply no question that a standard at 100,000 miles is much more stringent than the same standard at 50,000 miles. Furthermore, the increase in emissions between 50,000 and 100,000 miles is not necessarily a straight line relationship, especially at the very stringent levels of the standards proposed in S. 2203.

Third, the methodology completely ignores the fact that certification is not the only requirement manufacturers must meet. In fact, the Clean Air Act requires that standards be met by well maintained, untampered vehicles in actual use. No certification program can duplicate all the varied usages and aging effects of vehicles in actual use, especially at the high mileages proposed in this bill. Thus, manufacturers must produce vehicles with certification levels below the standard to assure compliance in use. Low certification numbers do not indicate that a more stringent standard is achievable, but instead demonstrate the large margin that is required to assure compliance with current standards. In fact, because of the large scatter of in-use data, General Motors must achieve average emissions of well maintained and untampered vehicles in-use of about 60% of the standard to minimize recall risks. We have not achieved that goal as yet. More stringent standards would require correspondingly lower certification levels, and even lower internal goals for in-use emissions.

For the above reasons, we believe the proposed standards are not achievable with any technology known today. It will take an extensive development program to determine whether they could ever be achieved. We do know that it would require substantial improvements in current technology or the invention of new technology. The costs could be very high, but we have no way to estimate them accurately at this time. For example, multiple catalysts and multiple catalyst changes may be required. (Catalyst changes are not allowed under some current EPA regulations.)

Improving catalyst technology presents another challenge. Catalysts are the most advanced and only proven technology for controlling vehicle emissions to the levels required today, but catalyst efficiency would have to be greatly improved to meet the proposed standards. Essential to catalyst performance is the scarce metal rhodium. As exhaust flows through the catalyst, rhodium promotes the reduction of NOx, transforming the gases into nitrogen and water. The proposed standards are so restrictive that, although increased use of rhodium surely will be necessary for all applications, just adding more rhodium to the catalyst will not do the job.

Even if it would, rhodium availability presents a major concern. All the rhodium being mined is already being consumed -- more than 50% by the automobile industry alone. The only major commercial sources of this metal are South Africa and the Soviet Union. Lower emission standards -- such as those proposed in S. 2203 -- would require that we import more rhodium, but more rhodium will not be available without substantial investments for new mines in South Africa. The current turmoil in South Africa is a major complicating factor.

Another complication arises from the fact that rhodium is produced only as a by-product of platinum mining, i.e., each 20 ounces of platinum is accompanied by one ounce of rhodium, and for that one ounce, it takes 180 tons of ore, requiring three man-weeks to extract, and six months to refine. General Motors has been investigating the reclamation of rhodium from used catalytic converters, but significant quantities of recycled rhodium are not available because it has been used in catalysts only since 1981.

The demand for rhodium in the automotive industry has grown rapidly in the last several years and is expected to continue growing in the next few years just to meet current requirements. The number of trucks using catalysts with rhodium will increase substantially beginning next year. In addition, Canada and other foreign countries, including many in Europe, are in the process of enacting emission standards which will add significantly to the demand for rhodium.

The price of rhodium -- fueled by automotive demand -- has more than tripled to more than $1,300 per ounce in the last two years. Because of the limited amount of rhodium production, significant upward price pressure is likely to continue as demand increases, and prices probably would skyrocket if legislation is adopted which would require still more rhodium usage.

General Motors continues to conduct research to search for alternatives to rhodium in exhaust catalysts. However, at this time no suitable substitute material has been found.

Increase in "Useful Life" of Passenger Cars

The problem of meeting the proposed standards in actual use is greatly exacerbated by the proposed doubling of the "useful life" to 100,000 miles. Just to accommodate the inherent catalyst deterioration with mileage, new vehicle emissions have to be significantly lower to meet a 100,000-mile standard as compared to a 50,000-mile standard. However, the prospect of being responsible for achieving such standards in use for 100,000 miles is frightening. As the vehicle ages, manufacturers' influence on emissions (through vehicle design) wanes, and emissions become more and more related to general engine condition, degree and quality of maintenance, fuel quality and usage of the vehicle. In fact, only about half the vehicles reach 100,000 miles before being scrapped or needing a major engine overhaul. Since it is extremely difficult to determine the contribution of these factors to the emission performance of the vehicle in the enforcement process, the manufacturer is likely to be held responsible for vehicles which exceed the standards. The end result is the absurd requirement that manufacturers guarantee the emission performance of the vehicle as it passes through the junk yard gate.

In addition to extending the compliance period, a doubling of the useful life to 100,000 miles also extends the warranty of the emission components to 100,000 miles. As noted above, at 100,000 miles, approximately one-half of the vehicles will have been scrapped due to mechanical wear-out or other reasons. Not only is it difficult and expensive (and wasteful) to design emission controls systems to last longer than many of the vehicles on which they are installed, but current regulations require many components of the system to be warranted for the vehicle's useful life (see Attachment 5).* In effect, manufacturers would be required to provide a lifetime guarantee for many components of the vehicle only remotely related to emissions control. Thus, a 100,000-mile useful life requirement would add significantly to the initial consumer costs of the automobile.

The proposed increase in "useful life" also would complicate the process for certification of new engines and vehicles. Certification testing, which currently takes about 18 months, would have to be conducted over 100,000 miles, doubling the time required and significantly increasing costs. If a problem became evident only at very high mileage, testing would have to begin all over again when the problem was corrected. Given the magnitude of the challenge the proposed standards would present, the 1990 model year effective date provides too little time develop the new technology needed, then design, build and test the resulting products. Where "invention" is necessary, it is difficult to estimate when compliance would be possible, because inventions cannot be programmed.

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*Attachment 5 has been retained in committee files.

Heavy-Duty Engine Emission Standards

The heavy-duty engine emission standards in S. 2203 would increase the required HC and CO emission reductions from the 90% mandated by the current Clear Air Act to 96% for HC and 98% for CO. However, the EPA's own estimates show that the 90% reductions already mandated by current law will reduce national hydrocarbon emissions by less than 1%. The incremental improvement produced by the standards proposed in S. 2203 would be miniscule, but would impose substantial additional costs, if indeed they could be met at all.

The proposed standards for NOx and diesel particulates are essentially equivalent to the standards determined by EPA to represent the maximum reductions achievable. These standards have already been promulgated by EPA and will become effective with the 1991 model year.

The methodology used for setting the heavy-duty engine standards parallels that used for automobiles and light trucks, but is even less valid in this case because of major mistakes in its application. The same general approach was used (again ignoring the inherent interactive trade-offs among different types of emissions), with the standard being set at the level representing the cleanest 25% of engines for each emission constituent. But in this case, while only diesel engine data were used to determine the heavy-duty diesel engine standards, the heavy-duty gasoline engine standards were based on a combined listing of both gasoline and diesel engines. Since diesel engines are inherently low emitters of HC and CO, the resulting gasoline engine standards represent emission levels which are unachievable by any known control technology. Obviously, diesel engine data should not be used to set gasoline engine standards. In addition, certain of the certification data used are incorrect, some being an order of magnitude lower than actual test results. It is notable that an examination of the certification data used in the analysis shows that not a single current model heavy-duty gasoline or diesel engine is capable of certifying to the emission standards proposed in S. 2203.

Some yet-to-be-invented catalyst control system would be necessary for heavy-duty gasoline and diesel engines to meet the proposed standards. Heavy-duty gasoline engine development studies using the best available catalyst technology show conclusively that attempting to achieve even the current 90% reduction standards generates excessive converter system temperatures. Thus, the application of catalyst control to heavy-duty gasoline engines is an extreme risk and we judge that it is not technologically feasible at this time. In addition, efforts to apply catalyst controls to diesel engines have been notably unsuccessful due to the low exhaust temperatures typical for most diesel engine operating conditions.

The cost of developing the needed, but as yet unknown, control technology cannot be accurately estimated, but would certainly be excessive in view of the fact that truck emissions will continue to decline as new, controlled vehicles replace older vehicles and as the more stringent emissions standards already promulgated by EPA for future years become effective. Based on past experience, it is virtually certain that compliance with the proposed standards also would result in substantial fuel economy penalties. These new costs would be one more burden on beleaguered heavy truck manufacturers which already face shrinking markets and increasing competition from imports. Furthermore, unless dramatic progress is made in the technological quest to reduce heavy-duty gasoline and diesel engine emissions, adoption of the standards proposed in S. 2203 would mean the end of production of such engines.

Under S. 2203 the EPA would also lose its current authority to revise heavy-duty engine emission standards based on technological and economic considerations as well as need. General Motors believes that specific heavy-duty engine standards should not be legislated, but that the EPA Administrator should continue to have the flexibility to set appropriate standards based on the need to achieve or maintain National Ambient Air Quality Standards, with consideration of costs and available fuel resources as well as technological feasibility.

Air Quality Standards

It should also be noted that the contribution of automobiles and trucks to atmospheric pollution has declined over recent years and will continue to decline, even in the absence of any tightening of legislated emissions standards. This will occur as newer, less-polluting vehicles replace older models with less-effective, or nonexistent, control systems.

This trend can be illustrated by looking at the three pollutants most closely associated with the automobile: carbon monoxide; nitrogen dioxide; and hydrocarbons, a precursor of ozone formation. Tightening the standards will not change the curve very much.

Most cities can now forecast compliance with the carbon monoxide air quality standard within the next few years, according to the Council on Environmental Quality (CEQ). Monitoring sites in the U.S. are showing steady progress of about 5% per year in reducing carbon monoxide concentrations, and overall carbon monoxide is down 33% in the last nine years. Moreover, EPA projects that the passenger car contribution to ambient carbon monoxide will decline almost 50% more by 1995 with no change in standards.

The nitrogen dioxide compliance situation is excellent. Every county in the U.S. except one is expected to comply with the nitrogen dioxide standard this year. And even that county -- Los Angeles -- is expected to comply within the next few years. The EPA estimates that total NOx emissions from cars and trucks will decrease an additional 20% from 1982 levels by the year 2000, as the entire fleet of passenger cars is replaced with cars meeting the current 1 gpm NOx standard, and trucks meet the more stringent NOx standards already promulgated by EPA for the 1988 and 1991 model years.

Ozone is a secondary pollutant that is formed in the atmosphere through the interaction of several pollutants. Ozone is controlled by reducing hydrocarbons, one of its precursors. With respect to ozone, CEQ projects most urban areas will comply with air quality standards by the end of the decade, although many of these areas will likely not meet the present 1987 deadline in the Clean Air Act. (It is urgent that some reasonable accommodation be made with the 1987 deadline to avoid the significant distortions in economic growth and employment that would be imposed on these areas as a result of their non-attainment status.) As noted earlier, EPA projects annual automobile hydrocarbon emissions will fall by nearly 45% from 1984 levels by 1995, even in the absence of any new control programs. Furthermore, if additional hydrocarbon reductions are deemed necessary, Stage II refueling controls and controls on gasoline volatility are clearly more productive and cost-effective strategies. (See General Motors Written Commentary on the U.S. Environmental Protection Agency "Study of Gasoline Volatility and and Hydrocarbon Emissions from Motor Vehicles," March 27, 1986.)

For example, if we have controlled 10 grams per mile to date at a cost of about $500, the cost is about $500 per million grams removed (over an average 100,000 mile vehicle life). If the additional cost of new controls is another $500 and if the in-use improvement is as high as 0.3 grams per mile, the cost would be $17,000 per million grams removed. Stage II and volatility controls producing similar reductions in hydrocarbon emissions are available at a fraction of that cost.

The NOx Inhibition Effect

There is scientific evidence which strongly suggests that NOx emissions standards already are worsening the nation's ozone problems.

Virtually all theoretical and experimental studies are consistent in showing that reducing NOx increases the level of ozone. Reducing NOx also moves the peak ozone concentration toward the area of highest population, a phenomenon that has been documented in the Los Angeles basin. Our scientists are convinced that NOx control in the Los Angeles area has offset the hydrocarbon control programs, which is why we have seen little progress in ozone control in that area over the last decade. In the previous decade, we made great progress in Los Angeles because hydrocarbon control was actually accompanied by increased NOx emissions. Our studies show that these effects apply in other areas as well, as detailed further in Attachment 6. *

Thus, lower NOx standards as proposed in S. 2203 cannot be justified in terms of a public health risk. In fact, the National Ambient Air Quality Standard for nitrogen dioxide which is set at a level to protect public health and to provide an "adequate margin of safety," was reviewed and reaffirmed just last year by EPA. Because of the large margin of safety in the nitrogen dioxide air quality standard and the widespread compliance, nitrogen dioxide is clearly the least of our air quality problems. As previously noted, this standard is already being met nationwide, with the exception of the Los Angeles area (and because California sets its own vehicle emission standards tighter Federal NOx standards are not needed to deal with problems in Los Angeles.)

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*Attachment 6 has been retained in committee files.

Stationary Source Requirements

Beginning January 1, 1991, S. 2203 would require all stationary sources of SO_2 and NOx which are 35 years old or older either to close down or comply with the Clean Air Act's new source performance standards (NSPS) -- strict technology-based emission standards that currently apply only to newly built facilities. Recently proposed NSPS for SO_2 emissions from industrial boilers are so stringent that compliance cannot be achieved simply by switching to low sulfur coal or oil. This bill, therefore, would force General Motors to retrofit approximately 150 boilers with costly flue gas scrubbers or switch to natural gas.

In addition, after December 31, 1991, S. 2203 would require utility boilers to meet an emission standard of 0.7 pounds of SO_2 per million BTUs of heat input or shut down after either 3,000 hours or 10,000 hours operation, depending upon the level of emissions. Certainly, this would constitute a severe restriction on such plants and would virtually eliminate the use of low sulfur coal as a compliance option, leaving flue gas scrubbing as the most likely compliance alternative.

Finally, the NOx reduction provision for major stationary sources would have a direct impact on our manufacturing facilities. The extent of this impact cannot be estimated because the provision requires, by January 1, 1995, "the degree of emission reduction attained by technology demonstrated to be available for application to existing sources, in any member country of the Organization for Economic Cooperation and

Development." It is not possible to predict at this time what the applicable technology will be, since the EPA Administrator is not required to identify such technologies until January 1, 1989. We are concerned that this provision would disadvantage American industry by imposing costs substantially higher than experienced by our OECD counterparts. This consequence could arise, for example, if a technology utilized in a single OECD member-state, coming from a single, small industrial source, was selected as the basis for setting the U.S. standard. If so, this would make it possible for a single industrial plant in a foreign country to set the standard applicable to all industrial sources within the U.S. In the case of General Motors alone, this new standard would apply to 150 plants, and would require enormous capital expenditures to bring these plants into compliance. It seems only fair to ask whether Congress intends to subject U.S. industry to such potentially inequitable economic restrictions.

Because the costs arising from this bill would be unique to production processes in the U.S. and not shared by foreign competition, domestic manufacturers would be placed at a further cost disadvantage in world markets. This would clearly have negative implications on the U.S. balance of trade and employment in this country.

Summary and Conclusions

There is still considerable disagreement as to the effects of acid deposition. A joint U.S.-Canadian effort has recently been formed to investigate the magnitude of the problem and potential alternatives for dealing with it. Rather than awaiting the results of this study and fashioning legislation based on its conclusions, S. 2203 would rush to impose costly, wide-ranging emission control requirements on motor vehicles and industrial and utility facilities. These requirements would be imposed despite a paucity of scientific evidence documenting any adverse effects and without any attempt to compare the tremendous costs of the bill with the benefits it is expected to produce.

Further controls on automobile and truck emissions are particularly unwarranted at this time because mobile sources contribute very little to the acid rain problem. The contribution of automobile and truck emissions will continue to fall in the absence of tighter legislated standards. Nevertheless, S. 2203 would impose mobile source standards that are so strict that they could not be met using any currently known technology. The methodology used to determine these stringent standards is seriously flawed. The proposed standards are so far beyond what current technology is able to achieve that serious questions arise as to whether production could continue at all. For these reasons and the others mentioned above, we cannot support S. 2203.

* * * *

Attachment 2

Sources of U.S. Auto Emissions
(Thousands of Tons Per Year)

Calendar Year 1984

	CO		HC	
Emissions If Standards Are Met	13,964	(42%)	2,119	(59%)
Manufacturer Related Excess	1,150	(4%)	164	(5%)
Inadequate Maintenance Excess	14,885	(45%)	1,010	(28%)
Tampering Excess	3,047	(9%)	305	(8%)
Total	33,046	(100%)	3,598	(100%)

Calendar Year 1995

	CO		HC	
Emissions If Standards Are Met	2,842	(17%)	743	(37%)
Manufacturer Related Excess	2,747	(16%)	460	(23%)
Inadequate Maintenance Excess	8,052	(48%)	432	(22%)
Tampering Excess	3,257	(19%)	369	(18%)
Total	16,898	(100%)	2,004	(100%)

STATEMENT

OF

VOLKSWAGEN OF AMERICA, INC.

CONCERNING AMENDMENTS TO THE
CLEAN AIR ACT
(S. 2203)

BEFORE THE

SENATE COMMITTEE ON ENVIRONMENT
AND PUBLIC WORKS

WASHINGTON, D.C.

SEPTEMBER 26, 1986

MR. CHAIRMAN, MEMBERS OF THE COMMITTEE, I AM DIETMAR HAENCHEN, EXECUTIVE ENGINEER OF THE VEHICLE REGULATIONS DEPARTMENT AT VOLKSWAGEN OF AMERICA, INC. (VOLKSWAGEN). I WELCOME THE OPPORTUNITY TO EXPRESS MY COMPANY'S VIEWS ON THE "NEW CLEAN AIR ACT," S. 2203.

S. 2203 WAS INTRODUCED AS A FAR REACHING BILL TO ADDRESS THE CONTROL OF A VARIETY OF AIR POLLUTANTS EMITTED FROM NUMEROUS SOURCES ACROSS THE ENTIRE UNITED STATES. THE SOURCES INCLUDE AUTOMOBILES AND LIGHT-DUTY TRUCKS AND AS A REPRESENTATIVE OF AN AUTOMOBILE COMPANY, I INTEND, IN MY COMMENTS, TO PLACE PARTICULAR EMPHASIS ON THE ISSUE OF MOBILE SOURCE CONTROLS.

ONE OF THE PRIMARY PURPOSES OF S. 2203 IS TO ESTABLISH A PROGRAM TO REDUCE ACID DEPOSITION. NATIONWIDE, THE CONTRIBUTION OF MOTOR VEHICLES TO ACID DEPOSITION IS RELATIVELY SMALL. FURTHERMORE, A PRECISE CONNECTION BETWEEN AUTO EMISSIONS AND WHAT APPEAR TO BE THE EFFECTS OF ACID DEPOSITION HAS YET TO BE FORMULATED. AS SUCH, THE ADOPTION OF MORE STRINGENT STANDARDS FOR MOBILE SOURCES WILL HAVE ONLY LIMITED SIGNIFICANCE IN REDUCING ACID DEPOSITION.

THE SPONSORS OF S. 2203 SUGGEST THAT THE CLEAN AIR ACT SHOULD BE AMENDED TO IMPOSE MORE STRINGENT STANDARDS FOR ALL CURRENTLY REGULATED EXHAUST EMISSIONS FROM PASSENGER CARS AND LIGHT-DUTY TRUCKS, BOTH GASOLINE-FUELED AND DIESEL-POWERED. IN ADDITION, S. 2203 SEEKS TO EXTEND THE CURRENT DEFINITION OF USEFUL-LIFE TO 10 YEARS AND 100,000 MILES. THE COMBINED EFFECTS OF THESE PROPOSALS WOULD PLACE UPON THE MANUFACTURER A REGULATORY BURDEN NEVER BEFORE EXPERIENCED.

THE LIGHT-DUTY VEHICLE EXHAUST EMISSION STANDARDS OFFERED IN THE BILL ARE, ACCORDING TO BACKGROUND DOCUMENTATION RELEASED WITH S. 2203, CHOSEN AS REPRESENTATIVE OF THE 1986 AVERAGE CERTIFICATION LEVELS OF THE 25 PERCENT CLEANEST VEHICLES. ANALYSIS OF THE 1986 CERTIFICATION DATA WOULD ACTUALLY SHOW THAT ONLY AN INSIGNIFICANT NUMBER, APPROXIMATELY 3%, OF THE 1986 CERTIFICATION FLEET, COMPLIES WITH THIS STRINGENT COMBINATION OF STANDARDS ACCORDING TO TESTS CONDUCTED FOR THE CURRENT 50,000-MILE CERTIFICATION PROGRAM. THIS IS CERTAINLY NOT AN ADEQUATE OR REPRESENTATIVE SAMPLE UPON WHICH TO BASE THE CONTENTION THAT THE S. 2203 STANDARDS CAN BE MET WITH CURRENTLY AVAILABLE TECHNOLOGY.

THE REVISED DEFINITION OF USEFUL LIFE MUST ALSO BE CONSIDERED WHEN ASSESSING THE FEASIBILITY OF MEETING SUCH STANDARDS. THIS REVISION EFFECTIVELY EXTENDS THE EMISSION CERTIFICATION PROGRAM AND EMISSION CONTROL SYSTEM WARRANTY COVERAGE TO 100,000 MILES. NO LIGHT-DUTY VEHICLE HAS BEEN CERTIFIED UNDER THESE CONDITIONS, AND IT IS DOUBTFUL THAT IT COULD EVER BE DONE. WHILE THE 1986 MODEL YEAR CERTIFICATION DATA SHOW THE DIFFICULTY CURRENT VEHICLES HAVE MEETING THE S. 2203 STANDARDS AT 50,000 MILES, DOUBLING THE USEFUL LIFE TO 100,000 MILES INCREASES THE STRINGENCY OF THE STANDARDS SIGNIFICANTLY.

S. 2203 FAILS TO RECOGNIZE THE DIFFICULTIES ASSOCIATED WITH EMISSIONS COMPLIANCE IN-USE. THE VEHICLE MUST BE DESIGNED SO THAT THERE IS ENOUGH OF A CUSHION IN THE CERTIFICATION EMISSION LEVELS TO ACCOUNT FOR VEHICLE AND TEST VARIABILITY AND THE CERTIFICATION VERSUS IN-USE OFFSET IN GENERAL. DURING CERTIFICATION THE VEHICLE IS OPERATED UNDER HIGHLY CONTROLLED CONDITIONS AND SERVICED STRICTLY BY THE RECOMMENDED MAINTENANCE SCHEDULE. ONE OF THE GREATEST TASKS FOR THE MANUFACTURER IS TO

DESIGN A VEHICLE THAT WILL COMPLY WITH EMISSION STANDARDS BOTH WHEN OPERATED UNDER THESE IDEALIZED CONDITIONS AND WHEN SUBJECTED, IN-USE, TO CONDITIONS BEYOND ITS CONTROL. A SIMPLE EXAMPLE OF THESE CONDITIONS IS THE MARKED DIFFERENCE BETWEEN CERTIFICATION AND COMMERCIAL FUEL SPECIFICATIONS. VOLKSWAGEN SUGGESTS THAT THE ASSESSMENT OF TECHNICAL FEASIBILITY MUST BE BASED ON THE CAPABILITY OF MEETING A COMBINED SET OF EMISSION STANDARDS FOR THE USEFUL LIFE OF THE VEHICLE WHILE IN THE HANDS OF THE CONSUMER. THE VEHICLE MUST ALSO ATTAIN CERTAIN FUEL ECONOMY GOALS AND DRIVE AND PERFORM TO THE HIGHEST EXPECTATIONS. WITH THESE CONDITIONS IN MIND VOLKSWAGEN FINDS THE S. 2203 PROPOSED EMISSION STANDARDS FOR BOTH PASSENGER CARS AND LIGHT-DUTY TRUCKS TOTALLY UNREALISTIC AND IMPOSSIBLE TO ATTAIN NOW AND IN THE FORESEEABLE FUTURE.

BY PROPOSING STANDARDS ON THE BASIS OF THE CLEANEST VEHICLES IN LAST YEAR'S CERTIFICATION PROGRAM, S. 2203 DOES NOT ACCOUNT FOR THE FACT THAT DIFFERENT ENGINE TECHNOLOGIES HAVE INHERENTLY DIFFERENT EMISSION CHARACTERISTICS. EXAMINATION OF THE CERTIFICATION DATA SHOWS THAT WHILE RELATIVELY CLEAN IN TERMS OF HC AND CO EMISSIONS, NO DIESEL-POWERED LIGHT-DUTY VEHICLE OR LIGHT-DUTY TRUCK EVEN COMES CLOSE TO MEETING THE PROPOSED NOX STANDARD. VOLKSWAGEN LIGHT-DUTY DIESEL VEHICLES ARE CURRENTLY AT THEIR DESIGN LIMIT FOR LOW EMISSION LEVELS. FURTHER REDUCTION OF NOX EMISSION LEVELS IS NOT TECHNOLOGICALLY FEASIBLE, PARTICULARLY IN CONJUCTION WITH STRINGENT STANDARDS FOR OTHER POLLUTANTS. THE 0.25 G/MI STANDARD WOULD CERTAINLY MEAN THE DEMISE OF DIESEL ENGINE TECHNOLOGY IN PASSENGER CARS. THIS TECHNOLOGY MUST SURVIVE IN THE MARKETPLACE AND CONTINUE TO BE DEVELOPED SO THAT WE ALL HAVE SOMETHING TO FALL BACK ON IN THE EVENT OF A THIRD ENERGY CRISIS.

IN SUMMARY, VOLKSWAGEN BELIEVES THAT THE MOBILE SOURCE PROVISIONS OF S. 2203, PARTICULARLY AS THEY APPLY TO PASSENGER CARS AND LIGHT-DUTY TRUCKS, ARE UNREASONABLE AND UNNECESSARY. THE PROPOSED STANDARDS ARE ARBITRARY AND WITHOUT ANY SOUND ENGINEERING BASIS. NEITHER CURRENT EMISSION CONTROL TECHNOLOGY, NOR ANY TECHNOLOGY WHICH COULD BE DEVELOPED IN THE FORESEEABLE FUTURE, IS CAPABLE OF COMPLYING WITH THESE STANDARDS OVER THE FULL USEFUL-LIFE OF THE VEHICLE. THE CONTRIBUTION OF THE AUTOMOBILE TO THE ACID DEPOSITION PROBLEM IS RELATIVELY SMALL AND DOES NOT WARRANT FURTHER MOBILE SOURCE CONTROLS. FINALLY, THE ENVIRONMENTAL PROTECTION AGENCY IS CURRENTLY ENGAGED IN A NUMBER OF ACTIVITIES INCLUDING ENHANCEMENT OF EXISTING MOBILE SOURCE EMISSION REGULATIONS TO ASSURE THAT REAL EMISSION REDUCTIONS ARE ACHIEVED BY IN-USE VEHICLES. EPA IS ALSO PROMULGATING NEW, MORE STRINGENT EMISSION STANDARDS FOR CERTAIN CLASSES OF MOTOR VEHICLES. IN LIGHT OF THESE ACTIONS VOLKSWAGEN RECOMMENDS DELETION OF THE MOBILE SOURCE PROVISIONS OF S. 2203. VOLKSWAGEN RECOGNIZES THAT OTHER LEGISLATION AFFECTING MOBILE SOURCE CONTROL HAS ALSO BEEN INTRODUCED, SUCH AS S. 2200. THE MOBILE SOURCE PROVISIONS OF THIS BILL, PERHAPS WITH THE EXCEPTION OF THE ANTI-TAMPERING PROVISION ARE ALSO ONEROUS AND UNWARRANTED AT THIS TIME.

THIS CONCLUDES MY PREPARED REMARKS. THANK YOU FOR YOUR ATTENTION.

STATEMENT OF
AUTOMOBILE IMPORTERS OF AMERICA, INC.

BEFORE THE
ENVIRONMENT AND PUBLIC WORKS COMMITTEE
OF THE
UNITED STATES SENATE
FOR THE HEARINGS ON
S.2203, THE "NEW CLEAN AIR ACT"
AND
S.2813 THE "ACID DEPOSITION AND SULFUR
EMISSION REDUCTION ACT"

SEPTEMBER 26, 1986

Good Morning. My name is Gregory Dana. I am Technical Director of the Automobile Importers of America, Inc. (AIA). AIA is a non-profit trade association that represents U.S. importers of passenger cars and light trucks. As such, AIA members account for over 90% of the vehicles imported into the United States. A membership list of AIA's companies is attached.

I am pleased to have the opportunity to present the views of AIA on S.2203 and S.2813. As background for our comments, it should be noted that AIA companies have been leaders in the development of emission control systems for motor vehicles. The closed-loop 3-way catalyst system and multi-port fuel injection systems which more precisely meter air-fuel ratio are two of the more notable examples of the innovations developed by AIA companies. Other less well-known, but, nonetheless, important technology advances have been developed and are being used by AIA companies. It is against this background of technological innovation that our comments are being made.

AIA's most fundamental comment on this bill relates to the question of need for more stringent requirements for motor vehicles. AIA recognizes the concern this Committee has over acid-deposition, but we are unaware of a substantial scientific basis that would justify the imposition of new technology on motor vehicles that could be costly to consumers.

Vehicle manufacturers have already reduced tailpipe HC and NOx emissions by 95% and 75%, respectively, from passenger cars. Light-duty trucks have achieved nearly similar percentage reductions for these pollutants. With respect to hydrocarbons and oxides of nitrogen, the relative contribution of mobile sources to total emissions has decreased in spite of growth in vehicle usage. Given the limited impact of mobile source NOx on acid deposition and that even further reductions will be achieved as new vehicles replace older, more polluting vehicles, additional or more stringent requirements are not justified.

In fact, more stringent standards might well reduce the replacement of old vehicles, and thus, be counter-productive. This is particularly true in the case of lower priced vehicles, because a significant cost increase will lead lower income individuals to retain their existing vehicles or to purchase a used car, instead of a new car. In these cases, turnover of the vehicle fleet to newer, less polluting vehicles would be hindered.

Given the significant reduction already achieved by the motor vehicle industry over the past 15 years, and the diminishing impact of vehicles on overall emission levels or precursors to acid precipitation, a serious question is raised concerning the cost-effectiveness of yet additional, incremental controls.

Turning to the specific provisions of S.2203, Section 3 contains stringent new standards for passenger vehicles and light and heavy-duty trucks, as well as requirements to double the useful life of a passenger vehicle. Simply put, we know of no technology that is capable of achieving the passenger vehicle and light-duty truck standards, particularly in view of the 10 year/100,000 mile useful life proposal. Meeting the *combination* of radically reduced HC, CO and NOx standards, plus double the useful life in 3 years presents an engineering problem of enormous proportions. Given the state of emission control technology as it exists and as it can be foreseen, the radical breakthrough needed to meet the standards contained in this bill is not in sight.

While it may be true that one of these emission levels, such as for HC, can be achieved on a single engine family, the combination of *all* standards and *double* useful life makes the chance of compliance with these standards virtually impossible. The attendant reduction in model availability and potentially huge cost increases is likely to have catastrophic economic consequences.

Time alone will not alleviate the engineering problems with the mobile source requirements of this bill. The problem is with the standards themselves. Simply put, there is no demonstrated need for the levels proposed in the bill. It is difficult, for example, to determine the rationale for a nearly 3 fold decrease in CO and HC emissions in a bill whose primary goal appears to be acid precipitation control. Therefore, we respectfully urge the Committee to delete Section 3(a)-(e) from this bill.

While vastly less onerous in its mobile source provisions, as compared to S.2203, S.2813 would also lead to large incremental costs with little overall benefit to acid precipitation control. Any increased demand for rhodium use, which would be required by lower NOx standards, should be carefully considered given the instability in South Africa and its effect on price and supply of this mineral and the already known demand increase caused by adoption of 3-way catalyst technology by Canada and some of the European countries.

Finally, if there is one aspect of the vehicle emission control program that truly deserves to be addressed, it is the need to assure that gray market vehicles imported into the U.S. meet applicable emission standards. This Committee voted to address the gray market problem in 1982. AIA respectfully urges the Committee to do likewise again.

I thank the Committee for the opportunity to appear before you and will be happy to answer your questions.

THE NEW CLEAN AIR ACT

TUESDAY, SEPTEMBER 30, 1986

U.S. Senate,
Committee on Environment and Public Works,
Washington, DC.

The committee met, pursuant to recess, at 10:15 a.m., in room 406, Dirksen Senate Office Building, Hon. Robert T. Stafford (chairman of the committee) presiding.

Present: Senators, Stafford, Lautenberg, Burdick, Mitchell, Durenberger, and Domenici.

OPENING STATEMENT OF HON. ROBERT T. STAFFORD, U.S. SENATOR FROM THE STATE OF VERMONT

Senator Stafford. The committee will come to order, please. The leadoff witness is scheduled to be Gov. Thomas Kean of New Jersey, but his helicopter appears to be a little late. So, we're going to start.

Good morning, and welcome to the third of this series of hearings on the subject of air pollution control legislation. During two previous hearings the committee was told by various industry groups that the Clean Air Act as now written is adequate and no changes are necessary. They said that if additional controls were necessary, they should be imposed on some other sector.

Most of the testimony from these witnesses were simply a variation on a theme. That theme was that S. 2203, the New Clean Air Act, was too ambitious and too expensive, and an attempt to solve a problem that doesn't exist anyway.

This morning I hope the committee will begin to hear fewer and more muted criticisms of the bill. That's not to say that criticism of S. 2203 is inappropriate or unwelcome. On the contrary, legitimate criticism will help us enact and revise an improved version of the bill during the next Congress. That kind of objective and studied evaluation is a law which will receive broad support.

With the hope and expectation that this is the kind of testimony the committee will receive this morning, I'm ready to call our first witness after other opening statements.

Senator Burdick, do you have an opening statement?

Senator Burdick. No; thank you.

Senator Stafford. All right. Senator Lautenberg, do you have one?

OPENING STATEMENT OF HON. FRANK R. LAUTENBERG, U.S. SENATOR FROM THE STATE OF NEW JERSEY

Senator LAUTENBERG. I thank you, Mr. Chairman, and commend you for scheduling these hearings on acid rain, one of the primary environmental problems of our time. The hearings last week and the one we held in June have brought to the forefront the many many perspectives on this issue.

Of course, had Governor Kean been sitting in the chair, I would have welcomed him. But in absentia I do that and will have some comments to make when he does arrive, because I do join with him and many others in our State in the commitment to addressing the acid rain threat.

New Jersey is one of the many States that has seen the effects of acid rain and its related pollutants. We've seen decreased foliage growth and changes, as well as acidification of our lakes.

The ozone problem is of particular significance to New Jersey, which is unlikely to meet the 1987 Federal deadline for ozone reduction despite very stringent State laws. A contributing factor to New Jersey's ozone problem is the prevailing westerly winds that carry the components of ozone from Midwestern States, States which have weaker environmental standards.

These threats to our States and region in fact prompted New Jersey to join with six other Northeastern States in a suit against EPA. Although a Federal appeals court recently found that the basis for this suit was not sufficient, other suits by New Jersey are pending.

Many in the environmental community, including last week's distinguished witness, Mr. Richard Ayes of the Clean Air Coalition, have also concluded that EPA must do more to solve the acid rain problem. We must seriously examine the question of EPA's role under the current Clean Air Act requirements.

While some have called for more studies or have debated whether we face an acid rain problem, we face a very real threat; 100,000 tons of sulphur dioxide pollution is spewed out over our cities, forests, rivers and lakes every day. Left unchecked, these emissions will increase in the years ahead and continue to threaten our national resources.

Further, as we heard at our June hearing, the evidence is building on the health effects of air pollutants related to acid rain. The evidence is in, and it's time for Congress to act.

I look forward to working with you, Mr. Chairman, and the committee in the battle to protect our forests, our lakes, and our health from these insidious forms of pollution. I look forward to hearing from our witnesses who will be here today. And, again, we'll take the opportunity to welcome our distinguished Governor who has been a leader among our Nation's Governors in pursuing solutions to the acid rain problem.

And I hope that the press who's here from New Jersey will kindly note that and let the Governor know that I said nice things before he arrived.

Thank you, Mr. Chairman.

Senator STAFFORD. Thank you, Senator.

[Senator Mitchell's opening statement follows:]

OPENING STATEMENT OF HON. GEORGE J. MITCHELL, U.S. SENATOR FROM THE STATE OF MAINE

Mr. Chairman, this week we continue the series of hearings on acid rain. We have heard from some witnesses that acid rain is not a problem and emissions of acid rain precursors, such as sulfur dixiode and nitrogen oxides, present no risk to the public health and the environment other than to acidify a few lakes in the Northeast.

Some of the testimony we heard last week clearly demonstrates that acid rain precursors present serious risks to our health. Last week we heard from a witness who stated that sulfur dioxide and nitrogen oxides present a far greater risk to the human respiratory systems, particularly those of children, than previously believed. Testimony received today will also indicate that our forests and crops are being assaulted and injured by these pollutants, including creation of ozone. In addition, we will hear testimony from Western witnesses who can confirm that this is indeed a national problem requiring national solutions now.

Since the acid rain debate was first ignited, the scientists have amassed an impressive amount of data indicating that the problem is more serious and more pervasive than many of us first believed. Far from dissuading me that this is a small, regional problem, I am persuaded that action to control precursors of acid rain is needed now more than ever.

We have heard that the cost of acid rain controls is too high. The testimony I heard last week, and expect to hear today, leaves no doubt in my mind that the cost of not having acid rain controls is too high.

Senator STAFFORD. I think I see former Gov. Scott Matheson, very well-known to this committee and its chairman, an outstanding Governor. And, Governor, if you'd care to come forward as the first witness, we'd be very happy to hear from you.

Mr. MATHESON. Thank you, Mr. Chairman, Senator Burdick, Senator Lautenberg. I appreciate the opportunity to make a brief presentation on Senate bill 2203. I have filed my formal statement and would ask that it be made a part of the record, and then I'd like to take a few minutes to summarize it. I assume that's still a good custom with your schedule.

Senator STAFFORD. We'd appreciate your doing that, Governor. We will make your statement a part of the record. We'll do that for all of the witnesses. And then, if you'd summarize it, I think that would fall right into our hopes and plans.

Mr. MATHESON. Thank you.

STATEMENT OF HON. SCOTT MATHESON, PARSONS, BAILEY AND LATIMER, ON BEHALF OF WEST ASSOCIATES

Mr. MATHESON. I'm here today, Mr. Chairman, representing WEST Associates. It is a research and planning group of publicly and investor-owned utilities located out in the Western United States and the Southwestern part of the United States. The organization has 20 members and it serves about 19 million consumers in its service area.

I think I should add, Mr. Chairman, that Governor Kean is here, I notice, on the witness list to testify on behalf of the Alliance for Acid Rain Control. I think it's appropriate that I advise the committee that I am a member of the board of directors of that particular alliance with Governor Kean and Governor Earl and Governor Sununu, and others, and enjoy and basically support the efforts from that perspective in the acid rain field.

But today I am representing WEST Associates, and I'd like to address my attention to the impact of Senate bill 2203. And you indicated in your opening remarks, Mr. Chairman, that you're interested in constructive criticism. WEST Associates is opposed to Senate bill 2203, and I hope that reasons I can indicate will put that in its proper and helpful perspective.

We think basically that it is not as cost beneficial as other legislation, and that the commensurate benefits are not equal to the cost. This bill would effect nearly 20 percent of all of the generating capacity out in the West. And I think it's appropriate that I underscore that I come from the West and I bring the western bias. I don't apologize for it, but I think it's appropriate to put it out on the table early and talk about it in that context.

For westerners, this bill would cost about $5.5 billion annually. We think that that cost should bring a handsome return, and there are three areas of real concern from the perspective of this organization.

The first is the expanded definition of new source to include pre-1956 plants having to meet the newest emission limits. What that does is it essentially forces retirement of only about 3 percent of the Western States' generating capacity, but the cost of retiring that 3 percent is a fairly staggering replacement cost of $2 billion for new plants.

It may increase emissions slightly, as a matter of fact, depending upon the replacement capacity and the controls on that replacement.

The second concern is the restrictions on operating hours for plants emitting SO_2 over seven-tenths of a pound per million Btu's to either 3,000 or 10,000 hours over the life of the plant. I should stress that the normal life of a plant is 210,000 hours, and this essentially forces either a retrofit or a retirement that effects only about 16 percent of the operating capacity in the West. It also, if not retrofitted, effects reliability.

But with that done, it will only decrease western SO_2 emissions by a small 3 percent, but the cost for the restriction is about $1 billion annually.

The third concern, Mr. Chairman, is the NO_x control technology demonstrated elsewhere in the world being applicable to the United States, and particularly in the West. That will effect nearly all capacity in that region. It does require from our studies a forcing of technology that may be incompatible with installations in the West. There is also concern about the cost, which is about $4.5 billion annually for western customers, and new technology in this particular instance may be feasible, but in many cases may not be environmentally beneficial.

We're basically concerned with the failure of the bill to account for western regional differences. It is already a matter of record that the western utilities spend over $3 billion on air pollution control equipment alone without O&M in that number.

In addition to that, some excellent studies have been conducted in the West. One commission by WEST Associates, which was under the direction of Professor Hidy at the University of Nevada at Reno, and he concluded along with his colleagues that region-wide effects of acid deposition do not exist in the West and none are expected at current levels of exposure. That's a quotation from his report.

Two other reports; one by Washington State and one by the National Park Service, both indicate that the situation out in the West is dramatically different from the situation we find in the East.

We have been following, of course, the other pieces of legislation which have been introduced in the acid rain area, and we have noted that the Senate bill 2813, which is basically patterned after the alliance recommendations, recognizes that powerplant emissions are very low in the West—only 2 percent of the Nation's SO_2 comes from that area—and 4 percent of NO_x.

It is also true that because of prior legislation, particularly the Clean Air Act Amendment in 1977, that four times as much of the West capacity has been scrubbed for SO_2 than has been done in the East. I have an experience in my own State with a massive new coal-fired powerplant where the scrubbing costs on that plant were multimillion dollars. And, as a consequence, 57 percent of the generating capacity—if we look at all of the Western States—have been scrubbed, while only 14 percent has been scrubbed in the East.

We like that 2813 because it does allow a technology that can be achieved. It allows a trading of limits. It recognizes differences in emissions, both East and West. And I guess I have a personal bias toward it because it basically, Mr. Chairman, allows the Governors to have a major role in the decisionmaking process and how to bring about the bottom line results. And that particular federalist approach is always warm to the heart of a Governor or a former Governor, as I'm sure you will appreciate here on a personal basis.

I think that it's important to indicate that the western utilities have not abandoned in any sense of the word their concerns for the environment. They will continue massive research commitments in the field, particularly interdisciplinary programs. They have installed and will continue to install emission controls. Plans are to have spent or we will spend about $3 billion by 1990 on pollution control equipment alone.

So, let me conclude my comments about what we think sound legislation should be based upon, and there are three simple principals. The first is that regional distinctions should be fully considered. Second, least cost methods of meeting emission targets should be used. And, third, responsibility for meeting emission limits should be incurred in relationship to the contribution to the problem.

That concludes my summary of my testimony, Mr. Chairman. I'd be pleased to respond to questions if you care to ask.

Senator STAFFORD. Thank you very much, Governor. I expect that we will hear from other witnesses this morning with some different views on just how speculative air pollution damage in the West may be and on the wisdom of acting now to avoid or moderate future damage. I have just two questions regarding information that I believe would be useful for our hearing record which, as I said in my opening statement, I expect will be the basis for changes and improvements in S. 2203, and I accept your criticism of that bill in the spirit in which you've given it.

Mr. MATHESON. Thank you.

Senator STAFFORD. Could you supply the inventory of old plants that would have to be replaced under S. 2203 because of the NSPS requirements, together with the current emission rates of those plants?

Mr. MATHESON. The technical people representing WEST Associates will be happy to supply any technical information you request, including that.

Senator STAFFORD. All right.

Mr. MATHESON. Let me verify that. I knew they would say yes, Senator.

Senator STAFFORD. I see they're nodding affirmatively. Let me add to that, then. Could you also supply the plants that would be affected by the 0.7 pound per million Btu provisions of the bill and the current emission rates for those plants?

Mr. MATHESON. Yes, indeed.

Senator STAFFORD. Finally, would you comment briefly on whether you believe any additional controls for oxide of nitrogen are desirable in the West? I might say that a witness later in the morning will strongly advocate NO_x controls to reduce visibility impairment.

Mr. MATHESON. The information that I have at the present time on that, on NO_x, is that if we did nothing there would be a slight increase in NO_x emissions by 1995. That's the context of which we would have to address that problem in terms of the West. And the WEST Associates does not believe that legislation is necessary at this time to solve that problem.

Senator STAFFORD. All right. Thank you very much, Governor.

Senator Burdick.

Senator BURDICK. Welcome to the committee.

Mr. MATHESON. Thank you, Senator.

Senator BURDICK. We've been seeing each other for a number of years.

Mr. MATHESON. Since 1958, I believe.

Senator BURDICK. I can't agree with you more because we see the West the same way. Not because we're westerners, but because we spend the money. Scrubbers is estimated to cost about 25 percent of the construction of a plant.

Is that about right?

Mr. MATHESON. That's about right, I believe.

Senator BURDICK. And we in North Dakota spent the money and they spent it in Montana, they spent it all through the West. Not so in the East. We made a determined effort to clean up that air. We've really done something out there. I think some credit ought to be given for those efforts.

In my State of North Dakota, I don't think every plant is scrubbed, but newer technology has reduced the pollution to a very minimum. I think that if we can get the rest of the country to do as much as we have, we've made a big leap forward in taking care of this problem.

Do you agree?

Mr. MATHESON. Yes.

Senator BURDICK. What did you say about the comparative costs between S. 2813 and 2203?

Mr. MATHESON. Senator, according to the Congressional Budget Office, the 2813 bill costs approximately $34 billion over 30 years to achieve a 10-million-ton sulfur dioxide reduction. Under Senator Stafford's 2203, a reduction of 2 million tons more would cost nearly three times as much.

Senator BURDICK. The cost?

Mr. MATHESON. Nearly three times as much.

Senator BURDICK. Then, it would be about $100 million? Is that right?

Mr. MATHESON. Yes, something like that. That's the Congressional Budget Office. I should point out it is limited to SO_2. It does not include NO_x.

Senator BURDICK. What about the timing of the two bills? Which one will bring some results faster and sooner?

Mr. MATHESON. Well, I believe that the legislation that is before us should move forward—the subject should move forward. The Stafford bill has an effective date of 1991, the Proxmire bill 1992, and the Waxman bill 1993. I think that those are matters which can be addressed in terms of the—as quickly as we're geared up to go and the policy is decided, the timing can then be selected.

Senator BURDICK. That is a material difference.

Mr. MATHESON. Yes.

Senator BURDICK. Well, you've made a good case for the West. Thank you.

Mr. MATHESON. Nice to see you, Senator.

Senator STAFFORD. Senator Lautenberg.

Senator LAUTENBERG. Welcome, Governor. Nice to see you. You come from a beautiful State that I occasionally visit. The Wausach Mountains and we like to go there occasionally in the winter because—and I know Governor Kean will not take offense, but the mountains in Utah are just a little bit higher than the mountains in New Jersey. Skiing is sometimes more challenging, though, let it not be said on the record for the New Jersey press.

Mr. MATHESON. That seems fair.

Senator LAUTENBERG. Governor, I listened carefully to what you had to say and there are just a couple of questions that I'd like to put to you.

One is, when we talk about aggregate costs, sometimes we get lost in terms of the significance to the individual ratepayer. What do you calculate it might mean for the average electric bill of the people served by the alliance of companies that you're representing here today on an annual basis?

Mr. MATHESON. I can provide that information to you, Senator, but I would hesitate to speculate about it without giving you a pretty careful basis with the proper assumptions. We will do so.

Senator LAUTENBERG. I'd appreciate that. You make reference in your testimony to the change that would be required from older oil and gas-fired plants coal-fired plants. And, of course, these changes are only necessitated if the older plants don't meet the emission standards that we're establishing under this legislation.

Is that the case, that gas- and oil-fired plants of that age, pre-1956, would not be able to meet the emission standards and would need to be replaced with new coal-fired plants, even though the older gas- and oil-fired plants tend to have lower emissions on a pound per million Btu basis than some new coal-fired plants?

Why do you make that assertion, Governor?

Mr. MATHESON. Of course the definition of new source requires that those plants meet the new emission standards. The transfer over to meet those standards that I indicated would reduce the generating capacity only 3 percent, but the cost was $2 billion.

Senator LAUTENBERG. The electric generating capacity?

Mr. MATHESON. Yes, 3 percent, at a cost of about $2 billion for new plants. The 3 percent is the percentage in that category now that would have to go through that process. In other words, we have a very small piece of the overall picture, and to bring it up to the new source standards we have to spend $2 billion.

That seems an inordinately high cost. That may increase depending on what kind of a replacement you put in. That could slightly increase emissions. It would depend upon how you did it and what controls you put on at that time.

Senator LAUTENBERG. Well, I assure you, Governor, that the purpose of the legislation is not to increase costs while increasing emissions, so I would hope that we'd have a chance to look at your testimony and perhaps get a little more deeply into it and see how you developed these assumptions.

Perhaps as we consider this legislation, there might be some consideration for achieving a satisfactory emission standard level without causing exceptional costs in terms of the older gas and oil-fired plants.

I've been in and out of Salt Lake City, a number of times, and I notice that though you have that most magnificent setting—in that basin, surrounded by the mountains, that you often have accompanying air pollution that I think Governor Kean, if it's any solace, is far worse than we experience in our crowded little beautiful State of New Jersey.

Isn't that a major problem, as I remember it over the years? Salt Lake was always concerned about trying to reduce the level of air pollution in that city. Isn't that compounded somewhat by having the excessive emission of noxious material?

Mr. MATHESON. Interestingly enough, Senator, we are served and have been for many generations by a major copper producer, a smelter and mill operation, just on the west side of the valley. And, of course, over the years we've put the blame for the air pollution problems in Salt Lake Valley on the industry. The industry shut down and the air pollution problems didn't all go away.

Basically we have automobile exhaust problems in Salt Lake Valley, and fortunately we have three counties—only three counties, that cannot meet the standards. Salt Lake County is one of them, but we have a program in effect on a county basis that is addressing that. And we intend within a reasonable period of time to meet the standards and solve that problem. It's much improved.

Senator LAUTENBERG. But the hydrocarbon emissions combined with the NO_x presents an ozone problem that has to concern you and the citizens of Utah. I do think that it's fair to say, at least assume, that the emissions coming from the energy generating plants contribute in someway to that problem.

Mr. **Matheson**. Of course we do have emissions. I'm not prepared to say that it's a serious problem or that we have a serious ozone problem at this time, Senator.

Senator **Lautenberg**. Unfortunately we in New Jersey in some ways are innocent bystanders to this problem because we are the beneficiary of the prevailing winds with whatever they bring. On a good day it's really nice. On a bad day, we find outselves having to deal with pollution that we didn't create. And, of course, the problem is perhaps more for us than it is indicated for you and your State.

But we know this, that acidification is taking place in many parts of the country, including the Far West. And that with your interest in the environment and cleaner air, I would hope that we can arrive at a position where we accommodate what our concerns are in the East and nationally in terms of a reasonable air quality, and at the same time not simply move the costs up to where it becomes impossible to provide basic electric energy at a reasonable cost.

Mr. **Matheson**. Yes. I certainly agree with your conclusion, Senator.

Senator **Lautenberg**. Thank you very much.

Senator **Stafford**. Thank you, Senator Lautenberg.

Senator Durenberger.

Senator **Durenberger**. Mr. Chairman, I don't know who Parsons, Bailey, and Latimer are, but I must say it's just great to see Scott Matheson again.

Mr. **Matheson**. It's nice to see you, Senator. That's a struggling law firm that I joined out in Salt Lake.

Senator **Durenberger**. Oh, is that right? It looks like the front line for the North Stars. I have just one matter that I was concerned about going through this statement, and that is the one thing I like about it as I read it, and that is this bill is critiqued for trying to treat everybody alike and they aren't. At least that's part of what I read here when you're talking about NO_x controls on powerplants and things like that.

Mr. **Matheson**. Yes, sir. One of the main thrusts of the concern is the fact that the regional differences are so profound that while we need to have a support and a solution of the problem at the national level, we ought to solve the regional problems on a case-by-case basis, kind of the way we're doing the economic solutions in New England and other places. I think the same argument could be made.

Senator **Durenberger**. At the risk of coming to a conclusion, I need to ask a question.

That is, I'm hoping that you don't mean to imply by this statement that the West—however you might call that, everything west of the Mississippi or something like that—can't have an acidification problem, period. And I would like to read this into your statement and I need you to react.

It is that you're critical of those who would judge you by world standards, something that's happening in the Alps, things like that, and try to apply today to western emitters of either NO_x or sulfur dioxide the same standards at the same time at the same timing and technology development that would be applied, say, in the Ohio River Valley where we know we are killing the trout streams in New England, or something like that.

In other words, I would like to be able to read your statement to say that the West has some problems with sulfur dioxide or sulfur emission, that they could get worse, but to insist that we in the West comply in each case of emissions. That the same standards today that you're requiring in some parts of the East, where you know you have source-receptor relationships, is not smart economics, or something like that.

Could I read your statement—or is it really stronger, that it just says we don't have a problem, we never will have a problem, therefore leave us out and pretend that there's two United States, there's an East United States and a West United States, and we in the West don't want to participate in anyway in the solution of the acid rain problem?

Mr. Matheson. I think the question really requires a two-part response. First, the studies that have been conducted out in the West, the one commissioned by WEST Associates, basically reached the conclusion there was no serious current problem. The State of Washington and the Park Service reached basically similar conclusions.

That doesn't mean that research and studies should not and are not going on. They should and are. And I think that's an ongoing commitment from WEST itself.

And then, second, the answer to the second part of your question, yes. We certainly do recognize that a specific technological solution in the Ohio Valley may not be the right solution assuming we have a problem in the West, and we ought to take a look at that on a tailor made basis; the regional approach as I mentioned before.

So, on the second part of your question, yes, I fully agree with that.

Senator Durenberger. Has WEST organizationally addressed some of the solutions to these problems including buying technology for the worst polluters from a fund that might be created from all emitters across the country, even though there might not be a direct relationship between their emissions and a current problem?

In other words, the sort of emitter pays principal with the funds going to solve today's worst problem and eventually tomorrow's worst problem?

Mr. Matheson. I think WEST has taken the position that the Congress examining the acid rain problem with all of the input that it can get should address the problem. They are not here to tell you how to technically review that, but I think from a professional perspective, obviously you better take a look at every option you can get your hands on, and then take a look at its feasibility, its worth, and its cost.

And, then, WEST, I should say, has not formally endorsed any particular bill. They're snuggling up pretty close to the Proxmire bill, but they are not endorsing any particular bill at this time, Senator.

Senator Durenberger. Thank you very much.

Senator Stafford. Thank you, Senator Durenberger.

Senator Mitchell.

Senator **Mitchell**. Thank you, Mr. Chairman. Mr. Chairman, I have an opening statement that I'd like to have inserted in the record, if you would.

Senator **Stafford**. Without objection it will be.

Senator **Mitchell**. Thank you. Governor, thank you very much for coming. Sorry I missed most of your oral presentation, but I have had the opportunity to read your statement.

Mr. **Matheson**. Thank you.

Senator **Mitchell**. And, as usual, you make an impressive case. I do have some questions I would like to ask. First, in your testimony you cite a study by a Dr. Hidy, which is a critique of an earlier study on the problem of acid rain in the west or acid deposition which is conducted by the World Resources Institute.

Did you know, Governor, there's some difference of opinion on which study is accurate, particularly the conclusions? So that the record may be complete, Mr. Chairman, I'd like to ask that a five or six page letter prepared by the World Resources Institute commenting on Dr. Hidy's study be inserted in the record at this point.

Senator **Stafford**. Without objection it will be.

[The letter referred to follows:]

WORLD RESOURCES INSTITUTE
A CENTER FOR POLICY RESEARCH

1735 New York Avenue, N.W., Washington, D.C. 20006, Telephone: 202-638-6300

March 13, 1986

Honorable Lee M. Thomas
Administrator
U.S. Environmental Protection Agency
Waterside Mall -- West Tower
401 M Street, S.W.
Washington, DC 20460

Dear Lee:

In his letter of February 10, 1986, Congressman John D. Dingell, Chairman of the Subcommittee on Oversight and Investigations, requested your views on the findings and conclusions of the World Resources Institute (WRI) report on acid rain in the West and its review by Mr. George M. Hidy for the Utility Air Regulatory Group (UARG). We are seriously concerned about a number of serious misrepresentations and misinterpretations of WRI's conclusions and recommendations in UARG review. In addition, there is a fundamental difference of opinion between Mr. Hidy and UARG on the one hand and the authors of the WRI report on the other. Let me elaborate.

Mr. Hidy did not anywhere in his critique bring into question the basic data and information that constitute the main body of the WRI report. As a matter of fact he concluded that the "main body of the survey generally is conservatively written given available information about conditions in the West." His disagreement, as he puts it, is with "the tone of the introduction as well as the summary and conclusions." Our clear difference in opinion and philosophy is well illustrated by his statement that "no damage from acid deposition has been documented. Thus, the call for regulatory action in the West is premature." In other words, Mr. Hidy argues that regulatory actions must be after the fact, and after damage that may be irreversible has already occurred. We, on the other hand, believe that our policymakers have the rare opportunity of anticipating a problem and taking appropriate steps to correct it before serious damage occurs.

In the course of trying to support his case, Mr. Hidy made several misrepresentations of statements and conclusions in the

WRI report and proceeded to argue against them. Illustrative examples of these are numbered below followed by my discussion:

1. The conclusions of the WRI study essentially assume that effects already exist and their severity has been documented.

-- No where in the report do we talk about severe damage from acid rain in the West. On the basis of data that shows that sensitive ecosystems are receiving acidic deposition, we discuss the risk of potential effects should emissions continue to increase, as projected, upwind of these sensitive areas. In fact, we clearly state in the conclusions section that "how long chemical and biological changes might take; however, is still not well understood." Our thesis has been that there is a risk of potential damage to sensitive high altitude ecosystems in the West from acidic deposition. By recognizing now the relationship between acidic deposition and the sensitive areas, we are in a unique position to prevent irreversible damage before it occurs.

2. Lake and stream data suggest decreases in alkalinity in the past 15 years, and temporary depletion of alkalinity in (two) lakes indicate effects are occurring. Mr. Hidy then argues that the two events of temporary lake alkalinity decrease are based on undocumented personal communications.

-- In the summary and conclusions sections of our report we say "the rate at which acid-neutralizing capacity is likely to decrease in western ecosystems cannot yet be predicted, but preliminary data suggest that the decrease may already be under way in parts of the West."

With regard to the two events of lake acidification, it is worth noting that one of the so called "undocumented personal communications" is based on scientific research conducted by one of the coauthors, Prof. John Harte of Berkeley, at the Colorado lake. In addition, Mr. Hidy contradicts himself later on in his critique and supports our conclusion by stating that "such incidents can be expected in these shallow, very low alkalinity lakes if a storm deposits even mildly acidic rain on them."

3. The report actually is a non-critical survey of existing information with over-emphasis on urging new regulatory action.... The list of emission control options covers a range of activity from transportation and land use constraints to stringent reductions in stationary source contributions, including electric utilities and non-ferrous smelters. (emphasis added).

-- WRI's recommendations address three important areas related to acid rain concerns in the West: (a) the paucity of monitoring sites, particularly at remote and high elevation sites, the existing information gaps on source-receptor linkages, and the degree and extent of potential damage likely to result from present and future levels of pollutants. For these concerns, five specific recommendations for expanded research and monitoring efforts were made; (b) known current emission sources that are reasonably linked to relatively high levels of acidic deposition in downwind sensitive areas. With regard to automotive NOx emissions, we recommended that EPA and the states formulate broad transportation strategies and put the proposed actions forward through the political process for public evaluation of merit, tradeoffs, and acceptability. As to the major sources of SO_2, we recommended that Congress does not extend the Non-ferrous Smelter Order beyond its current expiration date of December 31, 1987, an action that has been recently supported by many Rocky Mountains' States Senators, Congressmen and Governors. We also recommended that the U.S. negotiate an agreement for controlling emissions from Mexican smelters. Such agreement was also reached late last year. With regard to power plants, and since relatively few large facilities are responsible for a disproportionately high fraction of these emissions, we called upon the EPA to carry out an assessment of the contributions of these major power plants to acidic deposition in sensitive mountain areas; and (c) future sources of emissions which are projected to increase, particularly after 1990. In order to protect sensitive mountain ecosystems from increased acidic deposition, we called upon state and federal regulatory authorities to evaluate the cumulative impacts of a proposed new source on acidic deposition in sensitive areas as part of its siting considerations. In addition, and because the western states are an ideal

> region for developing solar and wind energy systems, we recommended that such renewable sources of energy be encouraged as a way for long-term reduction in SO_2 and NOx emissions.
>
> Another example to illustrate Mr. Hidy's philosophy and point of view should be added here. In the last paragraph of his critique he states that "renewable and non-polluting energy resources are in widespread use already." He then contradicts himself one sentence later by stating "the renewable energy sources are costly to install and operate except for water resources, and many have found only limited practical application because of their intermittent generation capacity."

In addition to these misrepresentations, Mr. Hidy also conveniently ignores the results of scientific research, both old and new, by making sweeping statements such as "no scientifically defensible evidence of forest alterations associated specifically with acid deposition have been reported despite many years of exposure to deposition from industrial emissions in certain areas of the West and the East." As far back as 1969, a U.S. Forest Service survey found that 1.3 million Ponderosa pines on 250 square miles in the San Bernardino National Forest were stressed or dying due to ozone which forms when nitrogen oxides (one of the precursors to acid rain) and volatile hydrocarbons react with oxygen in the presence of sunlight. In the East, visible damage to trees has been reported on Camel's Hump in Vermont and on Mount Mitchell in North Carolina. Scientists estimate that 80% of the red spruce on Camel's Hump are dead or dying. While we all understand that the complex phenomenon of forest damage cannot be attributed to one factor but to multiple factors acting together, there seems to be an emerging consensus that air pollutants, particularly ozone and nitrogen, play a central role.

Finally, Mr. Hidy goes on in his critique to present what he called a "more objective," "more valid," and "much less dramatic "set of conclusions," than those in the WRI study. It is interesting to note that the general context of the first five of his conclusions are essentially similar to WRI's except, of course, the wording which reflects the different philosophies and schools of thought to which the authors of both reports belong. This difference in opinion is also reflected in his sixth recommendation with the exception of his support for the broad WRI conclusion by stating that "in the absence of any significant direct information, experience gathered from Europe and the eastern United States gives concern for potential damage."

In conclusion, besides the difference in opinion mentioned above, another major difference between the WRI report and Mr. Hidy's critique needs to be emphasized. The WRI report was peer reviewed by distinguished scientists in government, academia, and industry. Since its public release, almost a year ago, it has been praised as a comprehensive review of available scientific information on acid rain in the West and for its objective treatment of the subject.

Sincerely,

Mohamed T. El-Ashry, Ph.D.
Senior Associate

/cv

cc: Honorable John D. Dingell, Chairman
Subcommittee on Oversight and Investigations

Honorable James T. Broyhill, Ranking Minority Member
Subcommittee on Oversight and Investigations

Honorable Henry A. Waxman, Chairman
Subcommittee on Health and the Environment

Honorable Edward R. Madigan, Ranking Minority Member
Subcommittee on Health and the Environment

Honorable John S. Herrington, Secretary
Department of Energy

Honorable John R. Block, Secretary
Department of Agriculture

Honorable George P. Shultz, Secretary
Department of State

Honorable Donald P. Hodel, Secretary
Department of the Interior

Honorable Malcolm Baldridge, Secretary
Department of Commerce

Honorable Otis R. Bowen, Secretary
Department of Health and Human Services

Dr. William R. Graham, Acting Administrator
National Aeronautics and Space Administration

Honorable Charles H. Dean, Jr., Chairman
Tennessee Valley Authority

Honorable A. Alan Hill, Chairman
Council on Environmental Quality

Honorable Charles A. Bowsher, Comptroller General
General Accounting Office

Senator MITCHELL. And without reading the letter, in summary it makes what I believe is a very impressive and persuasive statement regarding what this letter calls misrepresentations and misinterpretations of its conclusions and recommendations by Dr. Hidy.

And I think so that all of us may have the benefit of both points of view fully, I'd like to ask that this be placed in the record.

And one of the things that I'd like to ask you, Governor, to the extent that you can respond now and if not, we'd welcome a statement in writing, is it fair to say that Dr. Hidy's study did not challenge the basic data and information contained in the World Resources Institute study or report, but rather merely reached different conclusions based upon that data and information?

Mr. MATHESON. Well, let me just make a quick inquiry, Senator.

Senator MITCHELL. If you'd rather wait, Governor, and respond in writing, you'd be free to do that.

Mr. MATHESON. We'd be happy to do that. I was wondering if I could be helpful to you now at this point.

Senator MITCHELL. All right.

Mr. MATHESON. I think we'll respond to you in writing and clarify that, Senator.

Senator MITCHELL. Fine. I'd welcome that, Governor. In your statement you state that the members of WEST—and I gather from your opening remarks that consists of 20 publicly owned and investor-owned electric utilities in the West and the Southwest of the United States—that those members in the aggregate will spend over $3 billion in air pollution control equipment by 1990.

Mr. MATHESON. That's correct. Have or will.

Senator MITCHELL. Have or will.

Mr. MATHESON. Yes, Senator. I would be happy to furnish you with a list of the membership of WEST Associates so that you will know the names of the entities that are involved in it.

Senator MITCHELL. That would be helpful.

Senator MITCHELL. If I may ask, since that is have or will, how far back does that go? In other words, when do you begin adding up to get the $3 billion? Do you know?

Mr. MATHESON. I'll have to give you that in writing, Senator.

Senator MITCHELL. Would you do that? When did the investments commence.

Mr. MATHESON. Yes. When did it start, how much up-to-date, you want something definitive.

Senator MITCHELL. Yes. And also if you could tell us whether, as a result of those investments, there have been or will be any reductions in sulfur dioxide emissions in the area covered by those facilities.

Mr. MATHESON. I can tell you that we will supply that. I can tell you, as a matter of fact, that a good share of the generation out in the West since 1977, it's a high percentage of it, is all scrubbed. And the big powerplant in Utah, for example, 25 percent of the costs of that, or nearly that, pollution control equipment, many millions of dollars were spent. And that's replicated wherever new plants have been built.

Senator MITCHELL. One of the obvious differences between the World Resources Institute's report and Dr. Hidy's analysis of that report are the conclusions that they reached.

The Institute argues that—and I'll quote from their letter now so as not to be inaccurate—that there is a risk of potential damage to sensitive high altitude ecosystems in the West from acidic deposition. By recognizing now the relationship between acidic deposition and the sensitive areas, we are in a unique position to prevent irreversible damage before it occurs.

The history of this country in dealing with environmental pollution has been to wait until after demonstrated damage occurs, identify and deal with it. And we're now experiencing that in the East and in many other parts of the world.

No one would dispute your contention that there are differences in the ecosystems between the West and the East and differences in different parts of the world. Nonetheless, may I take it that you don't object to preventive action, do you, Governor, nor do your members, that if we can identify a risk that we ought to do what we can to prevent the realization of damage?

And you surely are not here arguing that we've got to wait and see some dead lakes and damaged ecosystems before we take any action.

Mr. MATHESON. Public policy should be made on the preventive basis. I don't think anyone in their public value system would disagree with that, Senator. May I suggest on the World Resources Institute report, in order so the record is clear on that, I would like to have a copy of the five-page report which you put into the record and have an opportunity to respond to that to make certain that all of the scientists have a fair shot at their technical conclusions.

Senator MITCHELL. Absolutely. You're welcome to it. It's a letter dated March 13, 1986, addressed to Lee Thomas from a senior associate at the World Resources Institute. Copies were sent to a lot of people. I'd be glad to give you a copy today.

Mr. MATHESON. Thank you.

Senator MITCHELL. And we'd invite not only you, but I assume Dr. Hidy was hired by essentially the same group that you represent.

Mr. MATHESON. Yes, that's correct.

Senator MITCHELL. And we'd welcome him making any comments that he wants.

Mr. MATHESON. Thank you very much.

Senator MITCHELL. I'll just conclude with a comment. You have made an impressive case, but I really believe that we do have an opportunity here, a unique one, to take preventative action. I find the intentions of the World Resources Institute, in fact, rather restrained and persuasive, and I hope that you and the industries you represent will see it as in the interest of the Nation and the Western States to cooperate in preventing damage before it occurs.

Thank you, Governor.

Senator STAFFORD. Thank you very much, Senator. And thank you, Governor, for your testimony this morning.

Mr. MATHESON. Thank you very much.

Senator STAFFORD. The next witness will be I think most appropriately introduced by Senator Lautenberg. I'll say he's very welcome here. And, Frank, I'll turn it over to you for an introduction.

Senator LAUTENBERG. Indeed. I'm pleased to have the opportunity to welcome our Governor here. I'll give him a chance to get seated and say that it's nice to see Governor Kean here. Usually I see him from that side of the desk and he's on this side of the desk in our State capitol.

Welcome, Governor. Governor Kean has been a leader on the issue of acid rain and has served as chairman of the Environment Committee of the Coalition of Northeast Governors. He had a very active role in the coalition on the National Governors' Association in working for acid rain control and legislation.

Today we welcome him here on behalf of the Alliance for Acid Rain Control. Those of us from New Jersey, and all of us on this committee, applaud Governor Kean's efforts and we're pleased to welcome him and look forward eagerly to his testimony.

Governor Kean and I share a concern about the environment in our State. People often mistakenly, because of our densely populated condition—the most densely populated State in the country—think that we are without some of the natural resources, the natural beauty, that enhances so many States in our country. But, if I remember correctly, over 60 percent of our State is still considered forested, which is defined as potentially harvestable timber. And that surprises people. We just use our living space more judiciously than lots of other places. But we do have a major concern about the environment generally because of our beaches and because we so value these precious natural resources that we have.

And, Tom, I'm pleased to welcome you here, and I'll turn the meeting back to the chairman.

Senator STAFFORD. Governor, let me add my welcome. We're very glad you're here. We appreciate the trouble you've gone to to be with us. We'll place your full statement in the record, and that will allow you to proceed in summary or from the statement, whichever you wish.

STATEMENT OF HON. THOMAS KEAN, GOVERNOR, STATE OF NEW JERSEY, ON BEHALF OF THE ALLIANCE FOR ACID RAIN CONTROL

Governor KEAN. Thank you very much, Mr. Chairman, and I thank the committee. Thank you for the opportunity to testify here. Let me introduce Brenda Davis who is also here with me from my Office of Policy and Planning, and Ned Helm who is the executive director of the Alliance for Acid Rain Control.

I will summarize my longer statement which I am submitting, but I might start by sharing with you a story that those of you who, like me, are baseball fans might remember.

Years and years ago, Frankie Frish, who was managing the Pittsburgh Pirates during one game, this heckler from the stands kept screaming at him over and over again and telling him basically how he should run the team. And finally in the ninth inning Frish walked over to the stands and very politely asked the heckler his name and his address and asked him what his business was.

And the man was quite flattered really. He told Frish everything he wanted to know, and then asked him why he was asking. And Frish said well, I'm going to be at your office bright and early tomorrow morning and I'm going to tell you how to run your business.

I say that, Mr. Chairman, because I know so many people come here to tell you how to run your business without really being asked, and that's why I deeply appreciate the opportunity that you've given me and the Nation's Governors to let you know what we think about the very important issue of acid rain.

I speak today on behalf of the Alliance for Acid Rain Control and, of course, also on behalf of the people of New Jersey. The alliance is a broad-based and bipartisan coalition of Governors, of corporate leaders, of people from the world of academia, of public interest groups, dedicated to winning passage of cost-effective acid rain legislation.

The alliance is chaired by Gov. Tony Earl of Wisconsin and our members include, of course, Governors from both parties from all regions of the country as well as respected leaders like your former colleague, Gaylord Nelson.

I want to begin, if I could, by commending you, Mr. Chairman, and the other members of the committee, because each of you have shown leadership in this absolutely vital issue. More than 3 years ago I had the opportunity to appear and tell your colleagues that I thought that if we continued to only study acid rain, that we would simply have the best documented environmental disaster of all time.

Today I'm pleased to return at a time when the question is not if legislation will pass, but when it will pass. This committee's leadership has been absolutely essential in putting acid rain control at the very top of our Nation's environmental agenda.

Each of the bills before this committee will achieve significant reductions in sulfur dioxide and nitrogen oxide emissions. All three bills would make clear that this Congress is committed to reducing the disastrous effects of acid rain.

S. 2203, the bill which you, Mr. Chairman, have introduced with a number of cosponsors is the most stringent in terms of overall emission reduction targets and a schedule for reductions. The alliance, working with Senators Proxmire, Humphrey, Simpson, and Burdick, has produced competing legislation, S. 2813, which we believe provides the regional technological and economic flexibility necessary to obtain a workable national consensus on acid rain control.

I'd like, if I could, to emphasize the three major principles, which we believe should shape Congress' response to acid rain. These principals are State flexibility, cost effectiveness, and the phasing of emissions reductions.

First of all, on State flexibility, if there's one lesson that I think we've learned in environmental protection it's the value of letting States tailor control strategies to their particular conditions. Nowhere is this as appropriate as in acid rain control.

Giving us—giving the States flexibility means letting States choose between lower sulfur fuels, energy conservation or coal washing, scrubbers or new clean coal technologies to clean their emissions and therefore to meet the overall standards.

Emissions from any single plant don't seem to me as a critical concern. It's the sum total of those emissions in a region which simply has to be reduced. States should have the flexibility to choose among whatever variety of options there is to reduce emissions cheaply and as quickly as possible.

The differences in cost can be enormous. The forced introduction of scrubbers we believe would result in three to seven times higher costs to consumers than if other technologies are used.

We hope, therefore, that you don't tie our hands and instead give each State the flexibility to choose the cheapest emission control technology. But if certain States are unable or are unwilling to meet the deadlines, then we would favor strict mandatory controls be imposed as S. 2813 suggests. We shouldn't and cannot tolerate delay. But we should begin with a presumption, and that presumption is that each State will act in good faith.

In this regard, I should also note that six States have already enacted acid rain control laws which rely on least cost approaches for reductions. And a flexible Federal approach will not interefere with these ongoing State innovations.

Second, as you know, the alliance as well as most Governors' organizations have endorsed the concept of the phasing in of emissions reductions. This has three advantages. First, it provides an incentive to utilities to select the least cost emission control options in the first phase; second, it encourages the development of clean coal technologies which are cheaper and environmentally preferable to scrubbers; and, third, it will also allow current research to reshape or strengthen our phase 2 goals.

The third key element of any acid rain control strategy should be energy conservation. States should be allowed to meet a total tonnage reduction target instead of an emission rate requirement. Emission rate requirements provide no credit for energy conservation, while effective conservation measures can lower overall emissions levels by simply reducing fuel use.

I believe that we should take every opportunity to incorporate incentives to conserve fuel and to conserve energy. It's good for the environment and it's good for our economic competitiveness.

Finally, Mr. Chairman, I would like at this point to make a personal observation. There's considerable disagreement, I know, over who should bear the cost for acid rain control. Some argue that those who cause acid rain are the ones really, who should pay the full cost to reduce it. However, on this point, let me speak for a moment for myself, instead of for the alliance.

I happen to believe personally that we should all share in this particular burden. I don't think we should view cost sharing as an abdication of the polluter pays concept. Instead, I believe we have to recognize that there are difficult economic conditions in our neighboring States and realize that many of our differences in terms of contributing to acid rain, are a result of history, or geography, or geology, rather than simple neglect or ill will.

Therefore, I strongly support the interest rate subsidies included in the House bill. This concept, which originally we pioneered in

New Jersey in 1983, would provide assistance to Midwestern States and limit the impact of any control strategy on consumers.

In New Jersey we've instituted revolving loan funds to supplement Federal grants and provided much needed new subsidies for major capital expenditures, in particular our resource recovery facilities and the treatment of our sewerage.

It works. Our air and water is cleaned, and it's cleaned at a much lower cost to the individual taxpayer. We, in New Jersey, do not cause acid rain. My State has among the strictest sulfur dioxide and nitrogen oxide emissions standards in the entire country. But we in New Jersey are willing to contribute to the solution because we, in New Jersey, realize that we will share in the benefits of that solution.

In closing, if I could, I'd like to remind the committee of the words of Solomon, in the Book of Ecclesiastes. "One generation passeth away and another generation cometh, but the earth abideth forever."

Never has the need for environmental protection been written more poetically or more powerfully. The law of God as well as the law of man demands that we husband the scarce resources of our world and we hand them over unsullied to future generations.

Today's laws, unfortunately, just haven't protected our lakes or our rivers from the scurge of acid rain. We need new laws and we're dependent, of course, on this committee to draft the best ones.

I'm totally convinced at this point that we're going to solve this problem. I wasn't just a few years ago. I just got back a few days ago from China. And one of the things that impresses them about our country is the American pragmatism, flexibility, and willingness to compromise. I think that will see us through this problem.

On behalf of the alliance I want to offer to you, Mr. Chairman, any help that we can give at any time. Together I believe we can develop strong acid rain control legislation, and I hope that the legislative principles that I've outlined this morning can be part of the final package that you put together in this committee for consideration on the floor.

I'd obviously be happy to respond on behalf of the alliance, or on behalf of myself, for that matter, to any questions that you might have.

Thank you very much.

Senator **Stafford**. Thank you very much, Governor. I noted in your statement you've expressed the fact that coal switching can be one of the techniques for reducing NO_x and especially SO_2. Coal switching, of course, as a practical matter involves western low sulfur coal and eastern much higher sulfur coal and the inherent problems of transportation, as well as the unwillingness of eastern high sulfur producers and their miners to give up the markets they have willingly. And I'm sure you understand that problem as part of the overall problem we have.

You wouldn't disagree with that, I don't think.

Governor **Kean**. No. Some of my fellow Governors have expressed that rather articulately.

Senator Stafford. I believe many areas in New Jersey, Governor, are not expected to meet the ozone standard by the 1987 deadline.

Do you agree that additional controls on sources of hydrocarbons and oxides of nitrogen are needed to address this problem? And how do you view the motor vehicle controls called for in S. 2203?

Governor Kean. I would agree with you, Senator, and as a matter of fact, have been pressing EPA on that very subject.

Senator Stafford. Good. Do the supporters of a two phased approach have any concerns about the possibility that this approach could end up costing more than a one time requirement, which might occur if actions taken by a utility in the first phase were not compatible with the controls determined to be needed to comply with second stage reduction requirements?

Governor Kean. I don't believe so because of the research that's going on.

Senator Stafford. All right. Governor, is it your personal belief that we do not know enough about the cause-and-effect relationships to require a 10 million ton or more reduction of SO_2, or is your preference for the two phase reduction tactic a political judgment?

Governor Kean. I would like the 10 million eventually, but I think practically we probably have to do that in two phases.

Senator Stafford. All right. Senator Burdick?

Senator Burdick. Welcome to the committee, Governor.

Governor Kean. Thank you, Senator.

Senator Burdick. I want to congratulate you. You say you've got everything cleaned up in the State.

Governor Kean. We wouldn't go that far yet.

Senator Burdick. Do you have scrubbers on your powerplants?

Governor Kean. We don't have scrubbers on some of them. I don't believe we have scrubbers on all our powerplants, no. We have a lot of oil and gas in New Jersey.

Senator Burdick. You don't have too much coal?

Governor Kean. No.

Senator Lautenberg. The North Jersey plant just outside Hackensack, and a couple of others that are major power producers there. And I'm not sure of the technique that's used on them. I think there's some scrubbing equipment on some of them.

Governor Kean. We can submit that for the record, Senator.

Senator Burdick. You do say in the conclusion of your remarks that we in New Jersey do not cause acid rain. Well, that's wonderful. I wish you would let us know what you've done.

Governor Kean. The point there, Senator, really is that we have among the highest standards of control in the country and we enforce those standards.

Senator Burdick. I wish you'd tell me what the condition of your powerplants are; what you've done to clean them up; scrub them or use other techniques.

Governor Kean. A lot of it is the source of energy, really, that is oil and gas rather than coal. But for the coal plants we have, I will submit that for the record.

Senator Burdick. Thank you. [See p. 397.]

Senator Stafford. Senator Lautenberg.

Senator Lautenberg. Thank you, Mr. Chairman. Governor, your testimony was interesting and very forthright, and I appreciate the opportunity to chat with you about this.

I think there was something that Senator Burdick talked about for a moment that I'd just like to review for the record. And that is that New Jersey has quite a good record for at least working on the problem of cleaner air. I think it is fair to say, and the Governor responded that we haven't fully solved the problem.

Some part of that energy source, however, is often talked about here as a source for revenues based on imported oil fee, which would be very punitive for our State and several of the States in the Northeast. And the one thing I would hate to see happen is for us, or for even it to be suggested, that we ought to pay more for having a cleaner environment and producing the very serious energy demands that we have. So, I'm sure you'd agree with that, Tom.

I'd like to just ask you for a moment if I might about your evaluation of EPA's role in trying to deal with acid rain. You did respond to the chairman's comments in terms of EPA's role in the ozone area.

Could you capsulize your view on EPA's response to the acid rain problem?

Governor Kean. I would, of course, liked to have seen a more vigorous response over the years that we've all been working on this issue. On the other hand, they're handicapped I think, at the moment in part by the Clean Air Act.

Senator Lautenberg. Well, rather than handicapped, I think in some ways aided by the fact that there are standards established. And if they had one handicap I think it's because there has been a reluctance by the administration to go ahead and support the kind of environmental legislation that we, in our State, and lots of us in the Northeast face.

Governor Kean. I would like to see them more aggressive in the regulatory front. And actually a year or so ago I lead a delegation of Governors on this subject to talk to the President.

Senator Lautenberg. Our State has its unique problems. And while we wrestle with air pollution generally, I think you said we have yet to attain the air standard we want to.

How much of that would you think is caused by in-State facilities and how much of it, Tom, do you think is caused as a result of exposure of the carry over that we get from our western neighbors?

Governor Kean. Our problem has been ozone, and we're moving to phase two which we call vapor recovery to try and deal with that.

Senator Lautenberg. But we do have a problem with acidification of our lakes in the northwest part of our State. We see a stunted growth with our trees and our shrubs.

Is it not fair to say that perhaps without the very precise linkage between the acid rain problem and these manifestations, it is believed by many professionals and scientists that there is a direct causal relationship between acid rain and these particular problems?

Governor Kean. I don't think there's much doubt about that anymore, Senator. I asked, at my direction, the State Department of Environmental Protection did a study a couple of years ago. We have not reached the stage that some of the New England States have reached. We have had some damage to our lakes, particularly along the Kittatiny Ridge up in the Northwest.

We believe there has been some stunting in the pine barrens of some trees. My strong interest in this is that we don't reach any further stage, that we don't reach the stage that some of the lakes have reached in New England and some of the water supplies or some of the problems that they talk about in Massachusetts.

I believe if something isn't done about it we will. There's no question about it, we're on the way. But we have been damaged to some extent, we have not been damaged as much up to this point as some of the New England States. We know where it's coming from. We know, as you said, we're the victim of the prevailing winds and we can't do a great deal about that. That's why we're so strongly for the kind of bills that this committee is considering and also, by the way, so strongly for a strong reauthorization of the Clean Air Act.

Senator LAUTENBERG. Thank you, Governor.

Senator STAFFORD. Thank you, Senator Lautenberg.

Senator Mitchell.

Senator MITCHELL. Thank you, Mr. Chairman. Welcome, Governor, and thank you for your statement. The people in New Jersey are to be commended for the leadership their public officials are showing in the area of the environment. Your record is well known and has been discussed here today. Here in the Congress, Senator Lautenberg is probably most responsible for the Superfund reauthorization in the Senate and Representative Florio in the House, and also Senator Lautenberg has been a leader here in our committee in acid rain. So, the people in New Jersey are very well represented in this area, both in the House, the Senate and in the Governor, among the Governors.

Governor KEAN. Thank you, Senator.

Senator MITCHELL. We're in, I think, general agreement on the issue, Governor. There's one area where I, at least have some concern, and that is in the area of cost sharing, which you went into some detail in in your statement.

The legislation which I introduced back in 1981, the first legislation in this area, did not provide for cost sharing and still does not because, as you noted in your statement, the principal of polluter pays has been generally accepted in all national environmental laws.

You say in response to questions that New Jersey doesn't cause acid rain in large part because it burns fossil fuels which don't create acid rain. And yet, the fee, the subsidy, in the legislation which you support would, of course, be based upon the amount of fossil fuel that's used in generating electricity.

And I guess my question really is, Why should the people of Maine and why should the people of New Jersey pay more than they're already paying to clean up a problem caused by someone else, especially since their electricity rates are already much higher than those in the areas that are causing the problem?

It ought to be noted in this that electricity rates in the East are now 35 to 50 percent higher than they are in the Midwest in large part because some of the Midwestern States have not undergone the expense of either installing equipment or using cleaner and more expensive fuel.

And even if the most extreme legislation that is now being considered were adopted, and even if the costs rose to the extent proposed by the most ardent opponents of this legislation, the utility costs in the Midwest would still be lower than they are in the East.

Under those circumstances, you tell me why the people in Maine and New Jersey should pay more to clean up a problem that someone else has caused when they've already paid to clean up their own problem.

Governor KEAN. I believe in the principle of, first of all, of polluter should pay. But what we're talking about here is a modest form of cost sharing. The major cost would still under the proposal we support, I'm supporting personally, would still pay the vast majority of the costs.

It just seems to me that given some of the problems that the midsection of the country is now suffering under, the kind of job displacement, that asking them to bear the full cost would cause—is not really in the interest of any of us. We're talking about a small, modest subsidy compared with really asking those particular people to take on a cost which we believe—I believe, and what I've seen and what I've heard from those Governors, would be economically a tremendous burden to them.

Senator MITCHELL. But, Governor, the per capita income in Maine is lower than it is in every one of the States which you're suggesting needs to be protected. And so you're saying even though we already pay among the highest electricity rates in the country, we've got to pay more even though we haven't caused the problem, and even though our per capita income is lower than in the States which are causing the problem, you say, to shelter them from the burden.

Does that strike you as fair?

Governor KEAN. I'm talking only about a short-term, widespread low fee.

Senator MITCHELL. Well, how much would that add to the electricity bill of an average consumer in New Jersey? Do you know?

Governor KEAN. We figure at the highest it would be limited to 10 percent, and that would be at the highest ranges.

Senator MITCHELL. Ten percent. I don't know what an average bill is, but if someone in New Jersey is paying $75 a month for electricity, they'd be paying $7.50 more a month, they could be paying maximum.

Governor KEAN. They could be paying maximum, that's right. It could be somewhat less. [See p. 397.]

Senator MITCHELL. It could be less which is $100 a year. I don't know what the amount is in Maine, but I guess that's what concerns me. I understand the difficulty of achieving a solution to this problem, and I think there's some rationale, some force, to your argument. But I still have a great deal of trouble going back and telling people in my State, with a very high percentage of our work force employed at the minimum wage, with long, cold winters that require the consumption of large amounts of energy, with the per capita income right near the bottom of our country, now look, here is a problem that you didn't cause, and you're already paying for cleaning up here with these very high electricity rates, and I know your incomes are lower than those in the Midwestern States, but nonetheless you've got to pay even more to take care of that.

Don't you think that's a problem?

Governor **Kean**. I think there's no question it's a problem. I guess my view is—first of all, this is, of course, sunsetted. This is not a lasting cost. But what we have suggested here, this kind of rolling, rotating, fund may be the least expensive and the best way of eventually funding this program to get it through Congress and getting some support from areas that you're going to need support from, I believe, in order to eventually pass the program.

I happen to believe that this is such a priority for the people of Maine, for the people of New Jersey, for the people particularly of the Northeast, that in order to get a program and not delay it any further, I believe the people of my State would be willing to pay a very small cost on a limited period of time.

Senator **Mitchell**. If we could get it through without that, though, you wouldn't oppose that.

Governor **Kean**. No, I would not.

Senator **Mitchell**. All right. Thank you, Governor. Thank you, Mr. Chairman.

Senator **Stafford**. Thank you, Senator Mitchell, and thank you very much, Governor, for joining us this morning. We appreciate it.

The next witness will be Mr. Michael Walsh, a consultant of Arlington, VA. I would say to my colleagues that we have four more witnesses and we are beginning to run out of time. So, again, Mr. Walsh, I would urge you to summarize your statement. We'll place the entire statement in the record.

Mr. **Walsh**. Very good, Mr. Chairman.

Senator **Stafford**. And I think the room is now quiet enough so you can go ahead.

STATEMENT OF MICHAEL WALSH, CONSULTANT, ARLINGTON, VA

Mr. **Walsh**. Thank you, Mr. Chairman, very much for inviting me to appear before the committee today, and the other members of the committee as well. I will summarize my statement and submit it for the record.

Senator **Stafford**. All right.

Mr. **Walsh**. What I would like to do today is make several points, and I will make them very briefly in the interest of time.

First of all, I think that the health and environmental need for more stringent pollution controls is quite severe. Especially in this regard I would like to emphasize the need for further control of NO_x and particulates from mobil sources.

In addition, I think that the technology for light duty vehicles has advanced significantly beyond the levels needed to achieve today's Federal standards and we should take advantage of it. And I applaud the bill for doing that.

This great progress that we have made in this technology has occurred during the last 15 years in direct response, in my judgment, to the strong congressional mandates.

Third, heavy duty vehicle controls have advanced much more slowly over the same time frame reflecting in part the absence of specific requirements in the current law. Stringent NO_x and particulate controls had been delayed 4 years from the time of the initial proposals, and final action only occurred when it was ordered by the courts.

The automobile manufacturers you heard last Friday correctly pointed out during their testimony that the real objective of the motor vehicle pollution control program is to reduce in-use vehicle emissions and to improve air quality. In several ways, in my judgment, S. 2203 should bring about this result first of all by lowering the standards.

The experience over the last decade has been that as standards have been lowered, in-use vehicle emissions have also gone down. Second, by increasing the useful life requirements, which should improve the durability of the emission control components which go on the vehicles. And, third, by expanding the scope of the inspection and maintenance programs to include NO_x control. And, finally, by improving the quality of our fuels by requirement of the elimination of lead in gasoline and lowering the sulfur content in diesel fuel.

My last point is to attempt to put it in a little bit of a global perspective, having in the last several years spent a good deal of my time working with governments in various parts of the world. I think that this bill does attempt to bring together and does succeed in bringing together in one package some of the best developments from around the world.

As attachment one indicates, attachment one to my statement, we have led the world in the development of motor vehicle pollution controls. And, by the end of this decade, Canada, Sweden, Switzerland, South Korea, Austria and probably Norway will have adopted current United States automobile standards.

I've just returned within the last couple of weeks from visits to Brazil and Taiwan, which will phase these same standards in during the 1990's. Similar technologies are also going on cars in Australia, throughout the 12-member Common Market countries, and possibly throughout the gulf coast region.

Many of these same countries are starting now to look at heavy duty vehicle controls, and are looking very closely at what we do in this country. By taking advantage of light duty vehicle emission control advances which have occurred, and by fostering developments in heavy duty controls, S. 2203 is primarily addressing, of course, our specific environmental problems. But I believe it will also enable many other countries to also improve.

And, since many environmental problems transcend national boundaries, this bill should also help to improve, in my judgment, our global environment.

In addition, since we've been slower in this country to be concerned about acid rain, and certainly our colleagues in Europe, we're far behind in the introduction of stringent stationary source requirements. This bill will, therefore, enable us to take advantage of the developments in Europe, especially Germany, and substantially lower our NO_x and SO_x emissions.

I think I will stop my statement at that point, Mr. Chairman. I'd be happy to answer any questions you may have.

Senator **STAFFORD**. Thank you very much, Mr. Walsh. You might be interested to know that yesterday, or the day before, the last time we had a hearing on S. 2203, one thing that the diesel engine manufacturers agreed on was that they were against S. 2203 and the other thing they agreed on was that it would be highly beneficial to lower the sulfur content in diesel fuel.

I was interested in your comment on Brazil and other parts of the world and current United States standards for motor vehicles.

Is Mexico liable to become one of those countries that apply some technology to their cars?

Mr. **WALSH**. I just happened to have the occasion in Brazil to have some discussions with some of the officials from Mexico, and I'm happy that they are starting, at least, to take a look at that problem. They have among the worst lead content of fuel of anyplace that I know of in the world and their problems are certainly very severe. But I think they're starting to take a hard look at it.

Senator **STAFFORD**. The automobile manufacturers last Friday testified that we should not confuse emission certification test data and the emission standards. They went on to say that other factors in the manufacturers overall responsibility under the law require them to design to emission levels 20 to 40 percent below the specified standards.

Therefore, they pointed out, it's not surprising that certification levels are below the standards. In other words, they seem to say we cannot rely on certification numbers as good predictors of lifetime performance of vehicles or of achievable standard.

Could you comment on the relationship between certification numbers and the achievability of emission standards?

Mr. **WALSH**. I think the manufacturers make a valid point in that there is a difference between certification and in-use vehicles. And I think it's harder to achieve emission standards in-use.

On the other hand, certification vehicles are intended to reflect the design that goes on those vehicles, and they show the capability of the technology I think very well. The emission data that you have looked at in putting this bill together is based on 50,000 certification results, not low mileage certification results.

And, in addition, manufacturers do introduce vehicles into production that are certified virtually at the standards. So that does occur and it does reflect their confidence, presumably, that those vehicles are able to meet standards in-use.

Finally, I would point out that what is needed beyond certification is not any fundamental change in the design, but just good quality control on the assembly line.

Senator **STAFFORD**. All right. One of the auto manufacturers noted that the NO_x standard is not feasible for diesel cars.

Could you comment on that assertion?

Mr. **WALSH**. Yes. In 1981, we had very high NO_x and particulate standards in diesel vehicles. And I had occasion recently to look at the most recent certification results for these diesels. And in the period of about 3½ years, we've cut the NO_x levels by more than half and we've cut the particulate levels by about two-thirds simultaneously. And these are the pollutants that many manufacturers argued were just impossible to simultaneously do both of those things.

I think that the manufacturers on Friday spoke with some pride of their accomplishments and with good reason. And I share their sense of pride in that they are capable of doing quite a bit more than perhaps they state up front. And I'm confident that they could achieve these levels.

Senator STAFFORD. Would you have any observations about difficulties we could face in making catalytic converters in the future because of potential shortages of metal slag rhodium?

Mr. WALSH. I think that certainly the situation in South Africa is a very legitimate and serious cause of concern for many reasons. Having said that, I think that the auto industry prudently is looking at other technologies that could be capable of achieving these standards, as well as by using catalysts that have lower precious metal loadings and improving the calibrations of vehicles.

So, I think that we have to look at the other electronics improvements that were referred to on Friday, and perhaps some alternative base materials. The improvements in fuels that this bill will foster should help in that regard.

Senator STAFFORD. Thank you very much.

Senator Mitchell.

Senator MITCHELL. Thank you, Mr. Chairman. Mr. Walsh, we've heard testimony in these hearings from automobile manufacturers who say that they would be incapable of meeting those stringent emission controls. In your statement you indicate that mobile emission standards, more stringent than those now exist, can be met.

Could you provide us the basis for your conclusion?

Mr. WALSH. Yes, Senator, several things. First of all, in looking at the certification data, which again, as I mentioned, is intended to be representative of the cars that will be mass produced. Many of those vehicles are not only marginally below the current standards, but very substantially below the current standards.

With regard to other areas, specifically California, tighter standards currently do apply. Certainly for NO_x earlier this year the State of California, after a lengthy hearing process, adopted a 0.4 NO_x standard, showing that many vehicles in California are capable today of achieving these levels.

I also look at the certification results today in a context where these vehicles are not required to shoot for their lowest levels. These are the levels that they're achieving even though they don't have to strive for, say, the levels that are in the bill.

And, finally, when I was at EPA and subsequently, several regulatory analyses have been done, for example, looking at heavy truck controls that have made findings that tighter standards than currently exist are technologically feasible.

Just to mention one, with regard to heavy duty vehicle NO_x, EPA has found in the past that the statutory standard for gasoline truck of 1.7 grams per brake horsepower hour is feasible. And I've seen no evidence to challenge that.

Senator MITCHELL. Well, S. 2200, that's the legislation which I've introduced. It requires light duty vehicles to meet a standard of 0.4 gram per vehicle mile.

Is it your opinion that this standard could be applied nationally?

Mr. WALSH. No question in my mind, Senator.

Senator MITCHELL. And therefore, it would obviously follow that your opinion is that if the manufacturers assert that standard cannot be met, you disagree with them.

Mr. WALSH. Very strongly, Senator.

Senator MITCHELL. By what vehicle model year do you believe that such a standard could be in place?

Mr. WALSH. We have some vehicles today, more than half of the vehicles today, that are certifying to that level. I think the average certification result today is 0.38 gram per mile. So that indicates to me that the technology is widely available today.

Certainly there is a lead time to put that into production. We're into the 1987 model year at this time, so it would be 1988 at the earliest, 1989 would be a more reasonable judgment.

Senator MITCHELL. Thank you very much, Mr. Walsh. It was a very impressive statement. Thank you, Mr. Chairman.

Senator STAFFORD. Thank you, Senator Mitchell. Thank you very much, Mr. Walsh.

Mr. WALSH. Thank you, Mr. Chairman.

Senator STAFFORD. The next witness will be Mr. James Lents, acting executive officer, South Coast Air Quality Management District. Mr. Lents, we welcome you here from El Monte, CA.

Senator MITCHELL. Mr. Chairman, I want to apologize to Mr. Lents and the other witnesses. I've got to go to another meeting. I may have some questions for them in writing and ask that they respond to those.

Senator STAFFORD. All right. I'm sure that will be agreeable.

Senator MITCHELL. I'd appreciate it.

Senator STAFFORD. Mr. Lents.

STATEMENT OF JAMES LENTS, ACTING EXECUTIVE OFFICER, SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Mr. LENTS. Thank you, Mr. Chairman. As you stated, my name is James M. Lents. I'm the acting executive officer of the South Coast Air Quality Management District in California. Representing the district board, I am here to speak in support of S. 2203 and provide to the committee some insights regarding our need for and our experiences in imposing new and some of the most stringent air pollution control technologies in the Nation.

Our district is a four county agency in an area that includes the Metropolitan Los Angeles area and other cities in California's South Coast Air Basin where the air pollution problem is known to be very severe. Approximately 12 million people live in this area which has a forecasted population of about 18 million by the year 2010.

Under California air pollution law, districts such as ours regulate stationary source emissions. We work closely with the California Air Resources Board which has the responsibility to regulate emissions for motor vehicles sold in California.

Our most difficult air quality problem is photochemical smog. In 1984, for example, six of our air monitoring stations showed exceedances of the Federal ambient air quality standard for ozone on 125 or more days; over one-third of the year. On our worst days, ozone concentrations can attain levels that are three times the national standard.

We are also nonattainment in much of our area for other contaminants, including nitrogen dioxide—for which we are the only area in the Nation which is nonattainment—as well as carbon monoxide and particulates.

In an effort to meet the air quality standards for ozone and nitrogen dioxide, control strategies have been developed to reduce stationary source emissions of ozone precursors, such as reactive organic gases and oxides of nitrogen or NO_x.

Even with the implementation of the tightest automotive emission standards and the toughest overall industrial standards in the United States, we have been unable to demonstrate attainment by 1987 for the ozone ambient air quality standard.

In our area, NO_x also causes acid fog and acid rain. It reduces visibility and it causes respiratory problems. The extent of potential impacts is currently being studied by the California Air Resources Board. The district staff has found that areas which could be particularly susceptible to acid deposition are the mid- to high-level mountainous regions and the highly industrialized areas of the basin.

Continued control of NO_x and SO_x emissions can be expected to reduce the possibility of environmental risk associated with acid deposition. Visibility degradation due to particulate nitrates, sulfates, and carbon particles is also significant in the South Coast District, and this visibility degradation can extend beyond our boundaries.

Air pollution control efforts to date have improved ozone levels, NO_x levels, and visibility. But much remains to be done. Because of the long history of air pollution control in this area, no easy or cheap reductions are possible. To continue to improve our air quality, we are now considering, where technology exists, rules that will cost $10,000 or more per ton of reactive organic gases or oxides of nitrogen emissions prevented.

As an example, the district has declared selective catalytic reduction to be the best available control technology for control of oxides of nitrogen from gas turbines. This action was based originally on the Japanese use of SCR and was taken to reduce NO_x emissions from the many cogeneration projects being proposed in the district.

To reduce NO_x, we have also used SCR as best available control technology for asphalt batch plants, industrial boilers and refinery heaters. We have also required low NO_x burners on some home water heaters.

We clearly need to further reduce emissions from both stationary and mobile sources. The necessity for very tough vehicle emission standards is critical in our area, which has annual increases in vehicle miles travelled and significant predicted increases in population.

As a district, while doing all we can to reduce stationary source emissions, we obviously must also work to obtain reductions in mobile source emissions. We have succeeded in having a vehicle inspection and maintenance program implemented in the district in March 1984, and we support ridesharing and other VMT reduction techniques in addition to very tight emission standards for motor vehicles.

The effect of S. 2203 on stationary sources in the district would be to require some older facilities to reduce emissions down to levels already achieved by newer sources. It could have some effect on NO_x emissions from utility boilers and on SO_x emissions from refineries. However, the potential stationary source emission reductions from this bill would not be large because of the stringency of existing district rules which are stricter in many cases than the limits in the bill.

For example, only natural gas and fuel oil containing a maximum of 0.25 percent sulfur fuel oil are used as fuels for powerplants. And I might say as an aside that we are considering requiring 0.05 percent sulfur fuel oil in the future.

A more significant effect of this bill could occur because of its strict new motor vehicle standards for the 1990's. In particular, the passenger car emission standards for hydrocarbons, NO_x and carbon monoxide would be much lower than the present California standards for the same time period.

If these mobile source emission standards are established and attained, they will represent a major step toward the attainment and maintenance of ambient air quality standards in the district.

In conclusion, let me say that the district believes that S. 2203's approach to motor vehicle emission standards contains some very good goals, particularly for light duty vehicles. We also support diesel fuel quality changes to lower the sulfur content and reduce emissions of total suspended particulates. We strongly support the increased use of methanol as a fuel for cars and heavy duty diesel engines in buses and trucks.

And I might add that the mobile source limits in this bill I think would help push things toward methanol. That concludes my testimony.

Senator STAFFORD. Thank you very much, Mr. Lents.

Could you give us any insight into how the South Coast Air Quality Management District arrived at the decision to require SCR controls for NO_x?

Mr. LENTS. We have found it to be technically feasible. It is not inexpensive, but it is within a range that we consider reasonable considering the environmental problems caused by NO_x. Where it has been put in use in the district it has worked. It really has not been too very complicated to apply.

Senator STAFFORD. Are there any SCR controls currently installed?

Mr. LENTS. Oh, yes, on about three different facilities and there's about eight facilities coming on-line that will have it, including the investigation garbage burning facilities which utilize a very difficult fuel to control. But we believe it can be done.

Senator STAFFORD. Do you have any data with respect to the costs of controls that are installed?

Mr. LENTS. We think it's costing us in the $9,000 to $10,000 per ton of NO_x reduced for facilities that operate pretty much full time.

Senator STAFFORD. Can you comment here or for the record on the feasibility of the automobile standards in S. 2203?

Mr. **Lents**. We really don't have the expertise. We support what Mr. Walsh said earlier. We have looked at the data and there are a high percentage of existing automobiles operating that meet the standards as proposed.

Senator **Stafford**. All right, sir. I'm sure some of the members will have questions that they would like to ask you in writing since they're unable to be here. Would you mind answering in writing at your earliest convenience?

Mr. **Lents**. We surely will.

Senator **Stafford**. All right, Mr. Lents, thank you very much. The next witness will be Mr. John Bartlit, chairman of New Mexico Citizens for Clean Air and Water from Los Alamos, NM. We'll place your entire statement in the record, Mr. Bartlit, and ask you, if you would, to summarize it for us.

STATEMENT OF JOHN BARTLIT, CHAIRMAN, NEW MEXICO CITIZENS FOR CLEAN AIR AND WATER

Mr. **Bartlit**. Thank you, Mr. Chairman. I bring you this morning some special views from the West. You will see that the importance of these vistas is much of what I have to say today.

Despite damage by acid rain and health loss to the sensitive, I still believe the skeptic will find the most convincing and costly harm from air pollution in the West is its damage to long-range visibility.

For example, a careful study by the Institute of Policy Research at the University of Wyoming showed Americans were willing to pay $5.8 billion annually, 1980 dollars, just for the protection of visibility. I include the details of that study in my report.

Visibility loss has the same cause as acid rain, namely emissions of sulfur and nitrogen oxides. The particular causes are well established, which I document in my full statement. With the causes known, the cure is obvious—reduce the emissions from the known sources. Thus, acid rain and visibility degradation have the same cause and the same cure. They are the same issue. They can be solved as one.

Except for sparse class I areas, current State and Federal laws do not pursue, and in fact prohibit, the protection of long-range visibility. Ambient air quality standards are set at levels that correspond to 12 mile average visibility. I will devote a moment to the proof and history of this uncontested fact.

For particulate matter, legally allowed levels to protect welfare are set at a yearly average of 60 micrograms per cubic meter. According to the criteria document for particulate matter, this corresponds to visibility of only 12 miles on most days. This means a mountain or land feature could be invisible from 15 miles away half the time and still be considered legally acceptable air quality.

Who would ever consider this acceptable? The answer is people living in St. Louis in the mid-1960's. I give data showing the results of public opinion polls taken at that time and place. The polls showed that only 70 percent of the people were even aware of any pollution when it cut visibility to 5 miles, and only 30 percent cared that the visibility was that poor.

Surely that it not typical of feelings about visibility in deserts and mountains of the Southwest today. Yet, the roots of today's standards lie directly in the study cited and similar ones in Birmingham, Memphis, and Buffalo.

Visibility is the most easily damaged public value. It is demonstrably damaged by lesser amounts of pollutants than is health or vegetation. It follows that for all criteria pollutants, except invisible CO, protection of long-range visibility will assure adequate protection of all other health and welfare values. Visibility is the key.

A large measure of Washington thought has said the Feds should set minimum rules and leave control of unique local aspects to the locals. And we've heard some of that today as well.

States have responded with a hearty no thank you. By passing State laws prohibiting air rules more stringent than Federal rules, most States have replied, no, it must be done nationally to be effective.

I cite New Mexico statutes, that State air rules "shall be no more stringent than . . . the Federal act and Federal regulations . . ." in protecting visibility. A recent study found 34 States had similar legal language which in some aspect limited air rules to Federal requirements.

And at a time at which Washington decisionmakers, and I cite in my testimony Secretary Donald Hodel, Secretary of the Interior Hodel, who did not designate any integral vistas because, he said, the States had the authorities to do that. We, in New Mexico, cannot exercise discretion. It's forbidden by State law.

Such impasse can be resolved through effective national legislation like S. 2203 I come to support.

In the seventies, attention to stationary sources centered on particulates and SO_2. Now it's time to move aggressively against NO_x. NO_x impacts visibility in two ways. The first is the emissions of colorless NO from smokestacks that react quickly with air to produce the strongly red-brown colored gas, NO_2.

After stack clean up of dense particulates and white SO_x, the red-brown color of NO_2 becomes painfully obvious. We have seen this in the cleaned up powerplants in New Mexico.

The second way NO_x hurts visibility is by further conversion in air to form solid nitrates. These are fine particules that scatter light, and cause white haze in the otherwise blue sky, the same as ash and solid sulfates do. And it's well known the contribution of NO_x to acid rain.

Almost any development will do some harm to visibility. How best to balance the conflicting industrial and environmental needs of society? I believe the answer to be succinctly stated as follows:

> The key to balance in environmental and economic interests is new technology. There will be doomsayers who say "this can't be done." Non-polluting technology offers the way out of this impasse. Technological advances are not a pipe dream.

Those are the words of friend and fellow New Mexican, Pete Domenici, spoken October 14, 1978, at Waterflow, NM, to a gathering we each addressed, the dedication ceremony for scrubbers at the San Juan Generating Station of the Public Service Co. of New Mexico. Those words were true then. They're equally true today regarding NO_x technology.

Today's emission rules for NO_x are 10 years old. Technology has advanced both here and abroad. As a professional engineer, I am always struck by the wide disparity between the tenor of technology at hearings such as this, and that heard at technical symposia for the practicing engineer.

Once again, I suspect few developers of NO_x controls will step forward to testify vigorously about advances for fear of being blackballed by their industrial customers, as happened with ash and sulfur control suppliers a decade ago.

Everyone has heard about the excellent selective catalytic reduction technology of the Japanese. In addition, there are many alternative technologies which I cite in my testimony for getting very low levels of nitrogen oxides, well meeting the standards of this bill.

Perhaps the single most convincing brief statement I could make about available NO_x technology is this; in 1981, the technical staff for the California Air Resources Board concluded that 80 percent control of NO_x emissions from new coal-fired powerplants was both technically and economically available. California guidelines called for NO_x emissions of under less than 0.09 pound per million Btu's.

The staff concluded that NO_x controls would cost $42 to $66 per kilowatt installed, with levelized costs of 4.4 to 6 mills per kilowatt hour. They estimated somewhat higher costs for SO_2 controls.

In conclusion, let me say technological advances are not a pipe dream. But they will not be used to balance industrial and environmental needs unless required by Federal law. I support S. 2203 for its reasonable balance, for its national application, for its pursuit of technological solutions, and for its resultant help in protecting the valuable vistas of the West consistent with industrialization.

Obviously, for its lack of national application, S. 2813 does nothing to help the problems I have journeyed here to document.

I thank you for the opportunity to do so.

Senator STAFFORD. Thank you very much, Mr. Bartlit. I see now that Senator Domenici has made a special effort to get here and I'm going to recognize him.

Senator DOMENICI. Thank you very much, Mr. Chairman. Mr. Bartlit, it's always a pleasure to have you here. I think I speak for the chairman in saying that he is very concerned about the lack of any action in the Congress. This committee has a bill. It seems like we're winding up a session and I don't know if the chairman has any news that I don't have, but it appears that unless we have a lameduck session, it looks like the waning days will barely get us Superfund, much less the acid rain proposal.

Is that a fair statement?

Senator STAFFORD. I think that's a fair statement, yes.

Senator DOMENICI. Mr. Chairman, as a very active clean air advocate in our State, and one who has assumed high positions in the Clean Air Coalition in our State, John Bartlit, who happens to be an employee of Los Alamos National Lab also, and as an engineer, I think he has put New Mexico in a position where industry and clean air advocates have made some real significant progress. I believe he has gained in stature by not only advocating clean air, but listening and trying to work with the industrial sector in an effort to do a bit of convincing, and I summarize a bit of learning himself about their problems. I assume that's been a give and take, and I compliment him for that.

Mr. Bartlit, let me ask, in terms of the visibility issue, how would you answer those up here who would say your argument that New Mexico needs a national one, when we said they could exercise the authority, and their legislators passed a statute saying they won't?

I mean, you used that as an strong advocacy of national. There are many Senators who will use it as a strong advocacy for if they don't want to, why should we. It is their people, they represent them all, they are their vistas in a sense, unless we find some that are border and I guess there are some between each of our States.

What would your answer to that be? I mean, it's a strong argument up here, I can guarantee you.

Mr. BARTLIT. In my judgment, the reason that the State of New Mexico—it's really more than my judgment. I've talked to the people who have proposed and passed such legislation, is the fear of interstate competition for new plants and new industry. And they're afraid that if New Mexico is stronger than the Feds, and Utah, or Colorado, or whoever is not, then they will move across the border, build the plants there, the other States will get the economic benefit, and we'll still have the pollution.

And industry, of course, sees the opportunity to play off one State against another in this bidding game, if you will, for weak standards. It is not that the States or the New Mexico Legislature doesn't care about the views or would like to see them damaged. But the economic realities of competition for new industry is real. I support that. The only way around that problem is to make everybody comply with similar rules.

Senator DOMENICI. My last question is simply by way of an observation and an exchange of views. While I made that statement that you quoted me on, and while I agree that it's true, and while I further would agree that Federal intervention has caused technology to move forward, there's no question that the advances are made because of statutory limitations and time increments. You're only given so long before you have to do such and such. We got technology moving.

But I wonder in this era when we are beginning to be terribly worried about the cost to industry in America as it relates to our competitiveness—and you surely are reading a great deal about that, and we are besieged by it—it's lending itself to the new surge of protectionism and all the things we hear and read about that.

Do you assess this technology that we ought to be pushing as something that will add substantially to the cost ultimately of the user and clearly of the entities that must clean up, or do you assume that it can be done, and if done right it might not add substantially to the cost?

Mr. BARTLIT. I believe the cost is certainly modest and acceptable, but it is also clearly something. I'd say several things. First of all, pollution control technology itself is an industry for international competition in which the United States should be a major player. They have tended to lag. They lagged in ash control in the seventies, in sulfur control in the midseventies and NO_x control now.

Throughout my 15, 18-year career as an environmental advocate, I have usually found myself initially citing foreign technology as the shining light, if you will, of efficient technology for use. And then later, when—if I win my battle, if you win your battle, if we win our battle, we have an American industry providing that technology. So that technology itself is an industry.

Second, there are many examples, certainly not all examples, but many of the examples of the United States where we're fussing about the problem of foreign low-cost competition—and copper is one, which is very important in our State, as you know—again I cite a foreign country, the Japanese, that produce copper under conditions much cleaner than ours, and they sell it and they compete.

That says to me that the cost of the controls, even these very excellent controls, is not something in and of itself which determines the future of foreign competition in that industry.

And, third, I would say that much of what I've talked about here refers to powerplants. And powerplant power, unlike copper, cannot readily be shipped enormous distances.

Senator DOMENICI. Oh, I understand that. But there's a big cry in the State of New Mexico, that the cost of energy—at least electrical—is extremely high as compared with competing States. One of the arguments of the utility companies is that a substantial portion of that is because of the new plant with new cleanup equipment that they say adds a substantial cost. And so, it becomes passed on to those who use it as a competition issue.

It becomes an international competition issue if we were all paying the high cost because of that, if that was true, but State by State it's obviously a competition problem.

Mr. BARTLIT. My answer to that would be that the costs—I believe the figures that PNM quotes is about 20 percent of their electric bill is due to pollution control costs. This still leaves—and one could even add another 10 to 20 percent for nitrogen oxides, and it would still leave coal as the cheapest form of electricity in the West over gas or oil.

There was a recent discussion in the New Mexico newspapers—and I should get the details of this and provide it to this committee—discussions between Public Service Co. of New Mexico [PNM] and Southwestern Public Service—I am not sure of the exact title.

PNM had significantly higher rates. Southwestern's were lower. There was discussion over the reason for that. One of the reasons is obviously overcapacity on the part of PNM. But another contributor could be environmental controls.

The Southwestern utility was claiming that their controls were comparable. In other words, they were not going to say publicly, at least, that the reason their electricity was cheaper was because they were skinning, beating the environmental controls. I think the details of that would be relevant to this discussion because if the Southwestern utility costs really are much cheaper than PNM's, but they also have good pollution controls, then that is not the cause of the differences.

Senator DOMENICI. With reference to acid rain and visibility, I assume you know that we're having a difficult enough time making the prescription based upon health in trying to get something through because of cost. I'm sure we're going to have to work on this issue, and we will on the visibility as it relates to it.

But one of the big problems we're having, and I think the chairman will acknowledge, that while you favor his bill and this committe favors his bill, it is going to get hung up versus the other bills on cost. I'm assuming that if we made it more encompassing as it relates to visibility there would be an additional increment for costs to make the visibility standard national.

Mr. **Bartlit**. No, sir. What I am saying is that the things that you do nationally that reduce acid rain, in and of themselves, by those actions, protect visibility. They're one issue. What solves one problem, solves the other. The steps are the same, the costs are the same.

I'm not advocating additional steps for visibility. I am advocating national application so that the acid rain problem, which is the predominant one in the East, is resolved by these actions. And the visibility problem which, in my judgment, is the predominant current problem in the West and is real, is solved by the exact same actions in the West.

Senator **Domenici**. Thank you. Thank you, Mr. Chairman.

Mr. **Bartlit**. I might just add a bit. You say the concern for health. Fifteen years ago when I started, I was somewhat apologetic to discuss visibility as being perhaps an esthetic value, whereas human health with the dead bodies is more real and is of more concern and would have more punch to the voter, if you will.

I've changed my mind entirely. I really believe that in our part of the country, at least—and I almost think everywhere—more people will get interested in and willing to part with money to protect visibility than they will health effects.

And it's not that the health effects are not real, but they're less visible in a real sense to the people. They can see the visibility. When you see letters to the editor complaining about pollution, it's always visible things. It's not health damage.

I think it's real, the studies show it's real. People will part with money and that's what we're talking about.

Senator **Domenici**. Thank you very much.

Senator **Stafford**. Thank you, and thank you very much, sir, for coming here. We really appreciate it. Your testimony will be very helpful to us.

The last witness this morning will be Dr. Howard Heggestad. Doctor, I understand that you served as a research plant pathologist at the U.S. Department of Agriculture Research Center in Beltsville, MD. I'm pleased to welcome you here this morning.

Mr. **Heggestad**. Thank you very much.

Senator **Stafford**. We'll place your full statement in the record, Doctor, and invite you to summarize it for the committee.

Mr. **Heggestad**. Thank you, and I'll do just that.

STATEMENT OF HOWARD HEGGESTAD, COCHAIRMAN, NATIONAL CROP LOSS ASSESSMENT NETWORK INTERNATIONAL CONFERENCE, 1987

Mr. **Heggestad**. Before retiring, I was, as you've indicated, an employee of the U.S. Department of Agriculture and that was for nearly 40 years. My research on the effects of ozone began in 1958 when, with an associate from the University of California at Riverside, Dr. John Middleton, who was very active in air pollution controls, and I discovered that ozone was the cause of damage to tobacco leaves in the Northeastern United States.

This was the first evidence that there was a photochemical smog problem in the Eastern United States, as well as in the Los Angeles basin.

Ozone, per se, was first recognized to reduce crop production in 1957 on grapes in California, although damage to vegetables due to photochemical smog in the Los Angeles basin occurred at least a decade earlier.

It has been estimated that ozone alone or in combination with sulfur dioxide and nitrogen dioxide is responsible for 90 percent of the crop losses in the United States due to gaseous air pollutants. Currently the geographical regions with highest ozone concentrations are California, the Northeast, the Texas Gulf Coast, and the Chicago area.

Recent EPA economic estimates by an economist that is working with the National Crop Loss Assessment Network [NCLAN] indicated $1.6 to $1.9 billion benefits to agriculture producers and consumers if ozone concentrations were reduced 25 percent below current ambient levels.

Conversely, there would be a cost of $1.9 to $2.3 billion if ozone increased by 25 percent.

Losses to certain crops studied by NCLAN are included, others are not, and certainly there's no information on forests included. The actual losses to all vegetation could be much higher than the above figures.

There was one study conducted by Shriner, and others, who predicted $3 billion benefits, assuming a background of clean air to be 25 parts per billion. Uncertainties about ozone impacts on crops will be much improved when more is known about ozone concentrations in the agriculture production areas, about crop variety sensitivity to ozone induced yield losses, and about interactions of ozone with other pollutants, with plant pests, and with plant stresses such as drought.

Uncertainties about ozone impacts on forests will be improved as data becomes available from research recently planned and now getting underway, which you no doubt are aware of.

It should be noted that on many plant species there are no very distinctive symptons due to chronic ambient ozone exposures only accelerated leaf aging. For most observers, the impact of ozone on the crops and forests is obscured by the absence of acute foliar injury caused by high concentrations of ozone.

Consequently, good techniques to measure yield losses under field conditions are extremely important in determining the impact of elevated ozone concentrations. Accelerated aging, as premature leaf loss, and yield reductions caused by elevated ozone concentrations must be separated from that caused by other plant stresses. And we do have techniques to do just that.

Cotton is grown in about three States primarily, although there is a Cotton Belt. The highest ozone concentrations are in the cotton area of the San Joaquin Valley in California, where ozone levels averaged 0.077 ppm for a daily 7-hour period from July to mid-September 1981.

I might point out that 1 year later, the 7-hour average at that same site was 0.047 ppm rather than 0.077; 39 percent lower. Yet the yield losses were about the same, about 15 percent. So concentration isn't the only thing to look at. In that year with lower ozone values, there was higher humidty and more cloudy days, which caused plants to be more sensitive. In general, in the Eastern United States, our plants are grown under more higher humidity conditions, and with more cloudy days than in southern California. Our plants are much more ozone sensitive generally in the Eastern United States than they are in the western areas, where irrigation is a normal part of the culture and they have more sunshine, et cetera.

The value of 0.27 ppm for an hour in the Houston area is mentioned. During periods of air stagnation there tends to be about the same value in rural and urban industrial areas hundreds of miles downstream from the urban center. Again, there's a real lack of measurements of ozone to characterize the ozone pollution in the agricultural areas.

Citrus growers were first to recognize a problem with ozone. It was called photochemical smog. It was a hidden kind of injury. When techniques were available to assess leaf losses and so forth, they were able to establish a real loss even to citrus in the southern California area. In Riverside, San Bernardino, and Ventura Counties losses were estimated to be about $21 million in 1974.

Alfalfa is the most important species under forage. There's one study in California where some of the yields were reduced as much as 42 percent. The amount of damage depended upon which of two varieties were grown.

In a more recent study in the same area as the alfalfa study, with four forage grasses there was a 10- to 20-percent reduction in the yield and some reduction in carbohydrate production, which is an important criteria for forage.

Because of the relatively low value, forage plants have not been studied as much as food or fiber crops. With forage crops, usually there are mixes of species like clover and fescue. Studies that have been done show that the clover goes out of the stand years earlier because it's more sensitive to ozone.

Alfalfa is very sensitive to sulfur dioxide. In one study with 0.05 ppm sulfur dioxide for 8 hours a day for several days, there was no foliar injury. But, yet, under the controlled environment conditions there was a loss of 26 percent in weight of foliage and 49 percent in dry weight of the roots. The roots suffered because photosynthesis was reduced as a result of the pollutant exposure. Yield losses without visible foliar injury also occurs as a result of exposure to ambient levels of ozone.

Corn, which the most important crop agriculturally in the United States, is not very sensitive to ozone. In my testimony I point out that with a reasonable level of ozone like a 7-hour average of 0.06 ppm, in one study, the seed yield reductions were estimated to be only 0.3 percent. That was a study in North Carolina.

But there was a study more recently at the Argonne National Laboratory in Illinois which showed a 2.6-percent loss at the same ozone value, 0.06 ppm.

In contrast with field corn, sweet corn is extremely sensitive. And again, these studies were conducted in the southern California area, as many of the early air pollution studies. At a 0.11 ppm daytime ozone average there was a 39-percent loss.

I did some studies at Beltsville where ambient ozone concentrations average over 7 hours about 0.06 ppm, and found average yield losses for sweet corn, to be about 9 percent. The variety grown made a difference.

Soybeans are by far the most sensitive of the major crops. And you can see some visible injury. One researcher in 1977 in Minnesota showed a yield loss of 24 percent, that is comparing yields in filtered air versus nonfiltered air in some open top chambers.

More recent NCLAN studies at four sites showed the losses ranged from 11 to 25 percent. This depended upon the location and the variety grown. All were varieties most commonly grown at each location. Studies show that relatively slight changes in ozone concentrations will result in significant changes in soybean yields.

For example, a change of ozone concentration as little as 0.01 ppm in the 7-hour mean could alter yields of soybeans by 3 to 6 percent. Current ozone levels vary from 0.04 to 0.07 ppm for a 7-hour mean in most of the area that soybeans are grown.

A study of 7-hour values of 48 States in the country by EPA indicated that of 11 States with the highest values, the 7-hour values ranged from 0.048 ppm to 0.052 ppm which is not much difference. The States were Arkansas, California, Colorado, Connecticut, Nevada, South Carolina, North Carolina, Rhode Island, Utah, Virginia, and Wyoming.

Interestingly enough, Oregon and Washington had 7-hour values of 0.032 and 0.028 ppm, respectively. Considering the prevailing westerly winds, the precursors weren't there and this no doubt accounts for the low values in that area.

In more recent studies that I've been involved with at Beltsville we can separate the effects of drought from the effects of ozone. We've shown surprisingly to my colleagues as well as to others that if you have either stress alone, either drought or ozone, you have about a 5-percent loss. When the two stresses are combined, it's a 25-percent loss. That was a 2-year study.

There's been a more recent study with alfalfa in California which tends to support the above. Although similar, the differences were not quite as large. So, drought and ozone can, under some conditions, interact to cause more injury. In other situations the two stresses are only additive in their effects rather than synergistic as in our soybean study. Under other conditions, which is more generally the case, drought conditions tend to reduce or prevent ozone injury. Of course, drought stress in itself can be serious.

Information on wheat is primarily on Soft Red Winter wheat. The losses tend to be about 4 to 5 percent based on the information that has been obtained in the NCLAN studies and in some earlier studies at North Carolina.

There are many other crops which are significantly affected by ozone. We've looked at potatoes, snap beans, lima beans, tobacco, and spinach. There was one situation back 15 years ago on the Eastern Shore of Virginia where they grow about 30,000 acres of potatoes primarily for chipping. They had changed to a more ozone sensitive variety as it turned out because it was a better chipper and a higher yielder.

They had on some farms with this variety as much as a 50-percent loss. I was there at the time and was told that grown men cried because of the serious loss on an individual farm basis. There are losses to potatoes all up and down the east coast from New Jersey to Florida. There's very little loss in Idaho, as far as I'm concerned. But again, there's a loss in southern California.

To summarize, I would say we know that present levels of ozone now in our air can cause economically significant reductions in many of our crop commodities, with soybean losses being greater than for other major crops.

We also know that reducing the ozone levels through control measures which reduce ozone precursors—that is, reactive hydrocarbons and nitrogen dioxide—would lead over time to significant reductions in ozone levels throughout the country, and particularly in areas now acutely affected by the problem.

I recommend that research be continued to remove the many uncertainties about the impact of ozone on crops and forest species. But, even now the evidence is sufficient to show important benefits from action to curb ozone air pollution.

Thank you, and I'd be glad to respond to any questions.

Senator STAFFORD. Well, thank you very much, Dr. Heggestad, for a very interesting paper. From the conclusions and recommendations in your statement, may I conclude that you believe actions to reduce ozone now are justified by what we already know about damaged crops?

Mr. HEGGESTAD. Yes; I do.

Senator STAFFORD. And is it safe to say that we know crops are damaged from ambient levels of ozone that are present around the country today?

Mr. HEGGESTAD. Widely so in many crops.

Senator STAFFORD. Well, thank you very much, Doctor. We appreciate your coming here very much.

Mr. HEGGESTAD. Thank you. It was my privilege.

Senator STAFFORD. In fact, we're grateful to all of the witnesses. And there being no others today, the committee stands in recess.

[Whereupon, at 12:35 p.m., the committee was adjourned.]

[Statements submitted for the record follow:]

Testimony of
Western Energy Supply & Transmission
(WEST) Associates

on

S. 2203
The New Clean Air Act
before the
Committee on Environment & Public Works
United States Senate
Washington, D.C.

30 September 1986

Presented by:
Governor Scott Matheson

Testimony of Western Energy Supply & Transmission Associates regarding S2203: The New Clean Air Act

I am Scott Matheson, of Parsons, Bailey, and Latimer in Salt Lake City, Utah, and I wish to thank the Committee for this opportunity to testify. Today, I am representing the Western Energy Supply and Transmission (WEST) Associates, a research and planning group of 20 publicly owned and investor-owned electric utilities serving approximately 19 million consumers in the western and southwestern United States. WEST is seriously concerned about S 2203 and strongly opposes such a radical and costly measure that will significantly impact the electric customers of the West without commensurate benefit. In summary, this bill could affect nearly 20% of the generating capacity in the West and cost Westerners up to $5.5 billion annually.

WEST is primarily concerned with the following three provisions:

1. The radical definition of "new source" that mandates that the oldest power plants must meet the newest emission standards.

2. The unprecedented and severe restrictions on operating hours for existing power plants, and

3. The requirement that technology demonstrated in other countries must be automatically applied to power plants in the U.S.

These provisions, when applied to the electric generating stations in the West, lead to numerous contradictions in policy coupled with severe economic impacts. And even worse, these impacts are felt even though there is no acid deposition problem in the West and even though the provisions will not lead to significantly reduced emissions in the West.

This total lack of benefit and severe hardships result from the bill's failure to recognize the significant regional differences between the eastern and western U.S., the over $3 billion already spent on pollution control equipment by the western utilities, and the fact that studies have not found an acid rain crisis in the West.

I would now like to briefly illustrate some of the difficulties with the three provisions cited. First, the new definition of "new source" proposed in the bill means that any power plant that went on line before 1956 would have to meet the most stringent new source performance standards (NSPS) for emissions, standards specifically designed for brand new power plants. If this provision is applied, essentially all pre-1956 power plants not meeting the NSPS will have to be shut down since there is probably no retrofit technology economically available that can be applied to pre-1956 plants to meet post-1986 standards. The net result of this forced retirement will be that older plants (primarily gas and oil fired plants) will likely be replaced with new coal-fired plants. The older gas and oil fired plants tend to have lower emissions on a pound per million Btu basis than some new coal-fired plants. In addition, the older plants are often less expensive than coal and provide some of the least expensive electricity to the customer.

Therefore, old, low cost, low emitting plants may be replaced by new, expensive, and relatively higher emitting plants. When this provision is applied to the Western U.S., the total emissions of SO2 and NOx may slightly increase, not decrease. In addition, even though this provision affects only 3% of the generating capacity in the West, the cost will be staggering, over $2 billion in capital expenditures alone for the new plants.

The second provision limiting operating hours is equally troublesome. The restrictions limit total operating hours for plants emitting more than 0.7 pound per million Btu of SO2 to either 3000 or 10000 hours total over the future life of the plant. Those limits are extremely stringent when one realizes that a typical baseload plant operates over 210,000 hours in its life. Essentially, then, all plants that emit over 0.7 pound per million Btu would be forced into retirement or forced to install retrofit SO2 controls.

Because of the low sulfur coal in the West and the significant emission controls already installed on western power plants, only approximately 16% of the generating capacity in the West would be affected by this provision. However, the cost of retrofitting that small amount of capacity would be enormous, more than $1 billion per year over 30 years, or a present value of about $7 billion.

If the utility customers do not spend this large amount of money to install retrofit controls, and instead must retire the affected capacity, serious region-wide reliability problems could occur in the mid-1990's. The Western Systems Coordinating Council regional forecast for the mid-1990's projects a reserve margin of about 28% on a regional basis. If the 16% capacity affected by the operating hours limitation were not replaced, the reserve margin would shrink to around 12%, well below the margin required for reliable service.

What the bill fails to realize is that in the West, those plants that emit over 0.7 pound per million Btu are often only slightly over 0.7. This is in sharp contrast to the eastern U.S., where plants can emit 5 to 10 times that amount. Therefore, in the West, the retirement or $1 billion per year retrofit program will only decrease SO2 emissions from power plants by about 13%, even with the most modern pollution control devices on the new plants. This is only a 3% decrease in total western SO2 emissions since power plants account for less than one fourth of the total western SO2 emissions.

The third provision regarding NOx control is the most burdensome. The provision essentially requires NOx control on all power plants equivalent to that demonstrated elsewhere in the world. This provision fails to recognize the significant technological differences between power plants in different parts of the world and even the U.S. To cite just one example, many of the power plants in other parts of the world do not couple NOx control with SO2 and particulate controls. One common technique for controlling particulate emissions in the U.S. is to use a fabric filter baghouse. Nowhere has post-combustion NOx control been coupled with baghouse particulate control on a full scale basis. And yet, this is exactly what this provision would require on one of the larger coal-fired power plants in the West. The costs to the western electric customers for this provision of the bill are huge, possibly up to $4.5 billion per year.

Another problem with the demonstration provision is that just because a technology is demonstrated to be feasible, it is not necessarily the most environmentally beneficial. For example, the catalysts used in some forms of post-combustion NOx control may be a hazardous waste and require disposal in secure landfills. (Catalysts must be replaced every year or two). Some of the NOx control technologies use gaseous ammonia and thereby there is significant risk to the workers and nearby public when such technologies are employed. Any requirement for controls must evaluate all of the environmental factors, just as is currently required in the existing Clean Air Act provision for the installation of Best Available Control Technology.

The economic and technological problems aside, S 2203 fails to account for the unique western environment. The bill applies the same restrictions to the West as it does to the East, even though no demonstrated acid rain problem exists in the West.

WEST Associates recently commissioned a study to be performed by an inter-disciplinary group of university scientists to evaluate what is known about acid deposition in the West. The study, chaired by Dr. George Hidy of the Desert Research Institute, concluded that "region-wide effects of acid deposition do not exist in the West and none are expected at current levels of exposure." In addition to Dr. Hidy's review, several additional studies have been recently released that focused on specific states. For example, the Washington State Legislature directed the Washington Department of Ecology to conduct a comprehensive evaluation of the phenomenon of acid rain. This study concluded "based on the information currently available, the Department was unable to detect any permanent or long-term deterioration of the environment in Washington as a result of acid precipitation. ... Concentrations and deposition rates (of acid) appear to be substantially lower than (in) some other areas of the world. ... Forests in Washington appear to be under little threat of damage from acid deposition." The Department further concluded that "the need to adopt more stringent regulations solely to address acidic precursors is undemonstrated at this time." To cite just one more example, the National Park Service has been studying the stream and lake chemistry in Rocky Mountain National Park since 1982. They have found changes in stream chemistry as would be expected in any natural system, but the data do not suggest significant acidification.

One might ask, then, why should some want to impose additional acid deposition controls in the West? The reason usually given is essentially as flawed as S 2203 before you: theories and situations observed elsewhere in the world, and especially in the eastern United States, are being blindly applied to the unique western environment. One of the real contributions to the science of acid deposition made by Dr. Hidy's study was to show how unique and different the western environment is. For example, National Acid Deposition Program data, obtained by the EPA, show that rain acidity in the West is generally within the limits of natural levels and less than one-fifth that of the East. All that anyone has been able to speculate is that there may be a problem someday in the West. And that speculation is not based on data, but supposition.

WEST Associates thinks that the supposition is indeed, not supported by the facts. For example, the atmospheric deposition of acidic chemicals in the West is only 3 to 20% of that in the East. Power plants in the West emit only 2% of all of the nation's SO2 and

4% of the nation's NOx. Western SO2 emission levels in 1995 are projected to be below 1980 levels and about half of what they were in 1970.

These significant regional differences and the latest scientific findings must be taken into account in any sound acid rain bill. One of the bills before you, S 2813 sponsored by Senators Humphrey and Proxmire and others, including Senators Burdick and Simpson, goes a long way toward recognizing those differences.

S 2813 does not unnecessarily extend additional controls into the western U.S. It recognizes that 57% of all western coal-fired generating capacity is already scrubbed for SO2 compared to only 14% in the East. It recognizes that 98% of western coal-fired generating capacity uses low sulfur coal.

S 2813 establishes controls on all sources of SO2 emissions, not just utility power plants. It establishes control limits for NOx that can be technologically achieved (burner modifications) at reasonable cost. It allows trading of emission limits so that specific units that technologically cannot be further controlled can be allowed to operate while the difference is made up elsewhere. This kind of provision allows the utilities to apply their engineering skills to provide the best possible protection of the environment while minimizing unnecessary costs to the electric customer.

Even though WEST Associates is opposed to S 2203, the members do not plan to abandon their concern for the environment. WEST has funded and is funding significant research efforts in the western U.S. The Hidy study was the first time that an interdisciplinary team was brought together to look at the entire environment, i.e., the atmosphere coupled with the terrestrial, forest, and aquatic ecosystems. Such comprehensive studies will continue. WEST is sponsoring studies to examine the change in snow chemistry over the last 20 years by studying a unique library of snow cores obtained in the Sierra Nevadas. Additional studies are examining the watershed chemistry of a lake in the Sierras to compare the chemistry and processes in this western environment to the processes in the East. Dry deposition, often hypothesized as being important in both the West and the East, is being studied by taking direct measurements in the Mohave desert.

Besides research, WEST Associates members are committed to pollution controls. WEST members have spent or are committed to spend by 1990 over $3 billion in air pollution control equipment alone. Western states have some of the most stringent emission limits in the nation, far more stringent than federal standards. In addition, the current Clean Air Act requires the installation of the Best Available Control Technology for both SO2 and NOx for any new plant, regardless of how small the environmental impact of the plant may be.

Mr. Chairman, WEST Associates believes that any sound acid rain legislation must adhere to three fundamental principles. First, unique regional distinctions must be fully considered. Secondly, least cost methods of meeting emission limit targets should be used. And, thirdly, responsibility for the cost of meeting emission limits should be incurred in relationship to contribution to the problem.

S2203 fails to meet all three of those principles, and therefore, WEST is opposed to enactment of such a measure.

ALLIANCE FOR
AC[illegible]IN

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TESTIMONY OF

THE HONORABLE THOMAS H. KEAN

GOVERNOR OF NEW JERSEY

ON BEHALF OF

ALLIANCE FOR ACID RAIN CONTROL

BEFORE THE

SENATE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

SEPTEMBER 30, 1986

Mr. Chairman and members of the Committee, I appreciate the opportunity to appear before you today to testify in support of acid rain control legislation. I speak today on behalf of the Alliance for Acid Rain Control and, of course, on behalf of the people of New Jersey. The Alliance is a broad-based bipartisan coalition of Governors, corporate leaders, academicians and public interest groups dedicated to winning passage of cost-effective acid rain legislation. The Alliance is chaired by Governor Tony Earl of Wisconsin with Governor John Sununu of New Hampshire as its vice chairman. Our members include governors from all parts of the country including Bruce Babbitt of Arizona, Mike Dukakis of Massachusetts, Rudy Perpich of Minnesota, Dick Riley of South Carolina, and Ted Schwinden of Montana as well as respected leaders like former Senator Gaylord Nelson of the Wilderness Society and former Governor Scott Matheson of Utah.

I want to begin by commending you, Mr. Chairman, and the other members of the Committee for your leadership over the last several years on this vital national and international issue. What was once viewed as simply a threat to sensitive lakes in the northeast has now become recognized as a much broader problem affecting lakes and streams in many parts of the country, as well as forests, valued statues and monuments, and most importantly human health.

And acid rain is not only an American problem. Disagreements over sources and contributions to the problem have entered the realm of foreign policy concerns with both Canada and Mexico.

Acid rain is also a well-studied problem -- too well studied for us to tolerate further delay. We have clear and convincing research evidence regarding the relationship between emissions levels and the acidity of preciptiation over time and the effects of excess acidity on the environment.

Other national governments have also recognized the threat, and are responding. For example, virtually all of the nations of the European Economic Community, as well as Canada, have formed the "30% Club" dedicated to reducing their sulfur dioxide emissions by that amount.

Must we wait for a "smoking gun"? Must we wait for even more massive and potentially irreversible effects before we act? By your actions in holding these hearings, and by your continued diligence in formulating legislative solutions, I know that this Committee would answer those questions with a resounding "no".

I am here today to express both my personal commitment and that of the other members of the Alliance to work with you in breaking the deadlock on acid rain legislation. My colleagues and I have been very encouraged by the development of broad support for acid rain legislation in the House. It appears that the question is no longer if legislation will pass, but rather when. All of us here this morning are in agreement on the need to take action as soon as possible. Each of the bills before this Committee will achieve significant reductions in sulfur dioxide and nitrogen oxides emissions. All of the major bills will make clear Congress' commitment to reducing the disastrous effects of acid rain. S. 2203, the bill you introduced with a number of cosponsors, Mr. Chairman, is perhaps the most stringent, in terms of overall emission reduction targets, and in terms of the timeframe for achieving those reductions. The Alliance, in working with Senators Proxmire, Humphrey, Simpson and Burdick in the development of S. 2813, has produced legislation which embodies the basic principles we feel are necessary to achieve a consensus on both the level and timing of reductions, and on the basic policies to achieve those reductions. S. 2813 is similar in many respects to HR 4567, a bill with broad support in the House of Representatives. HR 4567 presently has over 150 cosponsors, including the entire New Jersey Delegation.

Rather than providing a laundry list of points of agreement and disagreement between the various bills and the recommendations of the Alliance, I would like to emphasize the major principles which we believe should shape Congress's response to acid rain. Those principles include: state flexibility, compatibility with state laws, cost-effectiveness, and phasing of emission reductions.

State Flexibility

If there is one lesson we have learned over the last decade in environmental protection, it is the value of letting states tailor control strategies to their particular conditions. Nowhere is this as appropriate as in acid rain control. Giving states flexibility means letting states choose between using lower sulfur fuels, pushing energy conservation, washing coal, building scrubbers, or applying some of the new clean coal technologies to clean up their emissions.

Regional loadings of sulfur dioxide and nitrogen oxides must be reduced. However, emissions from any particular plant are not the critical issue. It is the sum total of emissions that must be the focus of our efforts. Likewise,the introduction of a specific technology should not be the aim of our efforts. States must be given the flexibility to choose among a variety of options to provide reductions as cheaply and quickly as possible. I say this because the differences in costs can be enormous. The forced introduction of scrubbers, which is likely to be the practical effect of S. 2203, will result in much higher costs to utilities and consumers, three to seven times as much according to available research. Cheaper alternatives do exist; S. 2813 and S. 2200, introduced by Senator Mitchell, give states the flexibility to choose among such options, as does HR 4567.

I recognize that a mandatory technology approach to emissions reductions eliminates the possibilities of delay or litigation which could result from a flexible state planning process. However, I am strongly committed to the need for state autonomy and flexibility. If certain states are unable to meet the planning and implementation milestones, we should not hesitate to act. In such cases, the legislation should require that strict mandatory controls be imposed, as in S. 2813. We should not tolerate delay, but we should begin with a presumption that all states will act in good faith.

Compatibility with State Acid Rain Laws

As a Governor, I am often concerned that federal legislation overlooks state regulatory efforts. In the case of acid rain, six states have enacted acid rain control laws. Each of these laws relies on least cost approaches to produce emissions reductions. A flexible federal approach would be compatible with these state efforts.

Phasing

As you know, the Alliance, as well as most governors organizations, has endorsed the concept of phasing of emissions reductions. We believe dividing the reductions into two phases has several advantages:

- It provides an incentive to utilities to select the least cost options in the first phase. Coal switching, coal washing, energy conservation, and cost-effective scrubber and fluidized bed combustion retrofits can be utilized to meet a five million ton reduction at a relatively low cost.

- It provides encouragement for the development of clean coal technologies. These technologies should be readily available in the early 1990's, when final decisions on phase two strategies can be made. This will mean that utilities may have a range of technological choices in phase two that are less expensive and environmentally more attractive than conventional scrubbers.

- It also allows for mid-course corrections to the reduction strategy. This will allow findings from current research to be utilized in reshaping and strengthening phase II goals.

By providing a clear deadline and a guaranteed market for new, effective and inexpensive strategies, Congress will be directly stimulating research and development. When taken together with the clear signal provided by the $5 billion Canadian/U.S. agreement which commits the U.S. to fund clean coal demonstration projects, great incentives for research are provided.

Energy Conservation

A key element of any acid rain control strategy should be energy conservation. To encourage this, legislation must be structured in a manner that will provide credit for use of conservation measures S. 2813 takes special note of this need by allowing states the option of meeting a total tonnage reduction target in lieu of meeting an emission rate requirement. Emission rate requirements provide no credit for energy conservation, while effective conservation measures can reduce overall emissions levels by reducing overall fuel use. While the results, in terms of emissions, may be the same, we should take every opportunity to incorporate incentives to conserve fuel and energy, as vital natural resources.

Cost-Sharing

I recognize that there is considerable disagreement over who should bear the costs of acid rain control. Some including the members of this Committee, and the Alliance for Acid Rain Control, would argue that those who cause acid rain should bear the burden of reducing it - the polluter pays approach. However, and on this point I speak personally, rather than as a representative of the Alliance, I believe we must all share in this burden, and not view this sharing as an abdication of the polluter-pays concept. I believe we must recognize the realities of the economic conditions of our neighbors, and recognize that many of our differences in terms of contributing to acid rain are a result of history, geography or even geology, rather than neglect or ill will.

I strongly support the concept of interest rate subsidies which is embodied in HR 4567. This concept, which New Jersey pioneered in 1983 as an element of the CONEG postion on acid rain, would provide assistance to midwestern states, and limit the impact of any control strategy on consumer costs.

In New Jersey. I have instituted the use of revolving loan funds to replace grant programs or simply to provide much needed new subsidies for major capital expenditure programs. These loans are used by recipients for various purposes, including interest subsidies, with the direct benefit to the public being lower cost in service. In my state and others, we require local governments to make major capital improvements, especially in the environmental area. Yet we have lost federal funds and state and local budgets are stretched as never before. As opposed to grants, revolving loan funds require greater financial participation by recipients, but offer some assistance on a continuing, long-term basis to meet capital needs.

New Jerseyans do not cause acid rain. We have among the strictest sulfur dioxide and nitrogen oxide emissions standards in the country. But we are willing to contribute to the solution. We will certainly share in the benefits.

Conclusion

In closing, I would like to thank you, the members of this Committee, for giving me the opportunity to address this very important issue. On behalf of the Alliance, I want to offer our help, Mr. Chairman, in developing strong acid rain control legislation. I hope that the legislative principles I have outlined this morning can be a part of the final package you put together in this Committee for Senate floor consideration. The leadership of this Committee on acid rain has been deeply appreciated.

I would be happy to respond to any questions you might have.

STATE OF NEW JERSEY,
OFFICE OF THE GOVERNOR,
Trenton, October 22, 1986.

Senator ROBERT STAFFORD,
Chairman, Committee on Environment and Public Works, U.S. Senate, Dirksen Senate Office Building, Washington, DC.

DEAR MR. CHAIRMAN: I am pleased to provide additional information for the record requested during my testimony on Acid Rain legislation before your committee on September 30th.

There are no power plants operating with scrubbers in New Jersey and none have had them for some time. Virtually all plants in our state utilize gas or low sulphur oil. For over 15 years, we have had state requirements for very low sulphur in fuel, thereby limiting the amount emitted from oil burning plants and the only two coal burning plants in the State.

I would also like to clarify for the record my response to a question by Senator Mitchell regarding the cost to New Jersey ratepayers of a subsidy to midwestern states as proposed in H.R. 4567. As currently written, this subsidy would commence in 1989. H.R. 4567 would add a surcharge of one-half mill per kilowatt hour to all electricity produced from fossil-fueled power plants. Since only about 75 percent of New Jersey's electricity production is from fossil-fuel plants, the effective tax would be even lower than one-half mill per kilowatt hour consumed. According to the Energy Information Administration, the typical residential customer in New Jersey in 1984 paid 96.6 mills (9.7 cents) per kilowatt-hour, the highest rate in the nation. An increase of less than one-half mill, therefore, would result in less than a one-half of one percent increase in New Jersey's electricity rates. For an average residential customer, it would increase rates a maximum of 38 cents per month, based on a typical monthly consumption of 750 kilowatt hours.

I very much appreciate the opportunity to testify. Passage of effective acid rain control legislation has been one of my highest priorities for several years, and I stand ready to assist you and the Committee in any way possible.

Sincerely,

THOMAS H. KEAN, *Governor.*

Statement of
Michael P. Walsh

Before The
Senate Environment and Public Works Committee

September 30, 1986

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My name is Michael P. Walsh and I am an independent technical consultant in the motor vehicle air pollution control field. My clients have included many government agencies, international bodies such as the World Health Organization, UNEP, the United Nations Industrial Development Organization, and the World Bank as well as private companies engaged in the manufacture of pollution control devices. At present, I am completing studies of Inspection and Maintenance and Heavy Duty Vehicle Emissions Controls for the Swedish Environmental Protection Board, and have done similar projects within the past year in Germany, Switzerland and Hong Kong. I am an advisor to the 10 Club, a group of primarily European countries, committed to substantial reductions in motor vehicle NOx. Within the past week I returned from a consultation to assist the government of Brazil in the development of its motor vehicle pollution control program. Also within the past year, I have been a consultant to this Committee in the development of S2203.

From 1974 to 1981 I was employed by the U.S. Environmental Protection Agency; during the last three of those years, I was the Director of the Office of Mobile Source Air Pollution Control. During my watch, the Office devoted major efforts to expanding the number of I/M programs around the country, and adopted the first diesel particulate standard in the world. In addition comprehensive truck regulations for HC and CO were adopted, NOx and particulate standards were proposed, and the entire heavy duty truck compliance program was revamped which included the adoption of a new transient test procedure.

I am presenting this statement as a private citizen, not as a representative of any government agency or company.

In my testimony, I would like to make several points points:

1. The health and environmental need for more stringent pollution controls is great. In this regard, I would like to especially single out nitrogen oxides and diesel particulates.

2. Technology for light duty vehicles has advanced beyond the levels needed to achieve today's Federal standards and we should take advantage of it. This great progress has occurred during the past 15 years in direct response to strong Congressional mandates.

3. Heavy duty vehicle controls have advanced much more slowly over this same time frame, reflecting in part the absence of specific requirements in the current law. Stringent NOx and particulate controls were delayed four years from the time of the initial proposals and final action only occurred when ordered

by the courts.

4. The auto manufacturers correctly pointed out during their testimony last week that the real objective of the motor vehicle control program is to reduce in-use vehicle emissions and improve air quality. In several ways, S2203 should bring about this result:

   a) By lowering standards - the experience over the last decade has been that as standards have been lowered, in use vehicle emissions were also lowered.
   b) By increasing the useful life requirements which should improve the durability of emissions control components.
   c) By expanding the scope of I/M programs to include I/M for NOx.
   d) By improving fuel quality by eliminating lead from gasoline and lowering the sulfur content of diesel fuel.

5. Looked at from a global perspective, this bill brings together in one package, the best developments from around the world. First, in general, we in the United States have led the world in motor vehicle pollution control. As attachment 1 indicates, by the end of this decade, Canada, Sweden, Switzerland, South Korea, Austria and probably Norway will have adopted current US auto standards. Brazil and Taiwan will phase them in during the 1990's. Similar technologies will also be on many cars in Australia and throughout the 12 member common market and possibly throughout the Gulf Coast region. Many of these same countries are starting to look very closely at our truck and bus control requirements. By taking advantage of light duty vehicle emission control advances which have occurred, and by fostering developments in heavy duty controls, S2203, of course, is primarily addressed at improving the US environment; however, I believe it will enable many other countries to also improve and since many environmental problems transcend national boundaries, S2203 should help to improve our global environment.

In addition, since we have been slower in this country to be concerned about acid rain, we are far behind Europe in the introduction of stringent stationary source requirements. The bill will therefore enable us to take advantage of developments in Europe, especially Germany, and to substantially lower our NOx and SOx emissions.

I would now like to elaborate on some of these points.

I. Need

1. Nitrogen Oxides

Opponents argue that further mobile source NOx control is not needed because NOx is not a major contributor to acid rain, most of the country is in attainment for NO_2, and NOx control will actually make the ozone problem worse. These arguments are in error as will be explained below.

Nitrogen oxides are a by-product of most combustion processes; in urban areas, usually from 30 to 50 percent is emitted by motor vehicles. As a class of compounds, the oxides of nitrogen are involved in a host of environmental concerns impacting adversely on human health and welfare.

A. Acid Deposition

Acid deposition results from the chemical transformation and transport of sulfur dioxide and nitrogen oxides. The major strategy for addressing the acid rain problem should be reductions of sulfur emissions; however NOx controls are important and will be increasingly so over the next ten to fifteen years. There are several reasons:

1. NOx emissions are responsible for about one third of the acidity in rainfall.
2. While emissions of SOx are expected to stabilize or hopefully even decline in the future, NOx emissions are projected to increase dramatically. In fact, the 1981 NAS Report indicated that NOx emissions could exceed sulfur emissions by the end of the century.
3. Under certain circumstances, such as the Spring snow melt, nitric acid is disproportionately responsible for fish kills in lakes and streams.

At the 1982 International Conference on Acidification of the Environment in Stockholm, it was concluded that the "acidification problem is serious and, even if deposition remains stable, deterioration of soil and water will continue and may increase unless additional control measures are implemented and existing control policies are strengthened." Therefore, the assembled experts from around the world continued, "we know enough to be able to say:

> Unless we reduce our emissions of sulfur and nitrogen oxides, more lakes and streams, more groundwater, more soils and forests will become acidified and we will be adding to the economic and aesthetic damage we have already done...Best available technology which is economically feasible should also be applied to reduce NOx emissions from both stationary and mobile sources."

This conclusion was reinforced during the International Conference of Ministers on Acid Rain which took place in Ottawa, Canada during March of 1985. The final declaration of the 10 participating countries commits each to "take measures to decrease effectively the total annual emissions of nitrogen oxides from stationary and mobile sources as soon as possible and at the latest by 1993."

B. Direct Health Effects

Nitrogen dioxide (NO_2) is linked with increased susceptibility to respiratory infection, increased airway resistance in asthmatics, and decreased pulmonary function. Even short term exposures to NO_2 have resulted in a wide ranging group of respiratory problems in school children - cough, runny nose and sore throat are among the most common - as well as increased sensitivity to bronchoconstrictors by asthmatics.

The World Health Organization concluded that a maximum 1 hour exposure of 190-320 micrograms per cubic meter (0.10-0.17 ppm) should be consistent with the protection of public health and that this exposure should not be exceeded more than once per month. The State of California has also adopted a short term NO_2 standard, 0.25 ppm averaged over one hour, to protect public health.

C. Photochemical Oxidants (Ozone)

The most widespread air pollution problem in areas with temperate climates is ozone, one of the photochemical oxidants which results from the reaction of nitrogen oxides and hydrocarbons in the presence of sunlight. Motor vehicles are a major source of both of these precursor pollutants.

Adverse health consequences associated with exposure to elevated levels of ozone include eye irritation, cough and chest discomfort, headaches, upper respiratory illness, increased asthma attacks and reduced pulmonary function. Recent data indicates adverse health effects at or below the current air quality standard. Even with this standard, almost 80 million Americans currently reside in areas which violate it. As illustrated in Attachment 2, about 75 of our major metropolitan areas currently exceed the health based standard for this pollutant.

Numerous studies have also demonstrated that photochemical pollutants seriously impair the growth of certain crops. For example, the Congressional Research Service of the U.S. Library of Congress found that, in the United States alone, "the short-run or immediate impacts of ozone are evident in annual crop yield decreases estimated at $1.9 to $4.3 billion." In the longer term, CRS points out that "ozone damage has resulted in disappearance of high yielding crops from localities and even from the genetic base." Other negative impacts include seed yield reduction of 10 to 22 percent in field corn, up to 33 percent reductions in wheat yields and from 24 to 50 percent reductions in soybean yields.

Just recently, the President of Weyerhaeuser noted that "Growth chamber tests show that ozone in excess of 500 parts per billion will cause visible damage to trees and other crops within a matter of hours. Experience in the San Bernardino National Forest, near Los Angeles, indicates that consistent levels of ozone in the range of 200 to 300 parts per billion will cause visible damage within the growing season, and in ten years of successive Summer exposure will kill Ponderosa pine trees." He expresses even greater concern with other results which indicate "a linear reduction in net photosynthesis - and thus in growth - with no visible damage, when ozone is in the range of 30 to 80 parts per billion."

D. NOx Control Is Necessary To Clean Up Ozone

Photochemical smog results from chemical reactions involving both hydrocarbons and nitrogen oxides in the presence of sunlight. While historically the major strategy for reducing smog has focused on tight restrictions on hydrocarbon emissions (a strategy continued with the hydrocarbon controls in this Bill), NOx control is also necessary, particularly with regard to the highest and, therefore, most hazardous levels. This conclusion was verified by a panel of experts convened by the National Commission on Air Quality (NCAQ), which found that, "NOx control as well as HC control is needed."

1. The most severe air pollution periods consist of multi day episodes during which NOx and other smog precursors have long periods of time to interact; under such conditions, even higher ozone values would result if more NOx were emitted because there would be "a high degree of day to day carryover of such key pollutants as NO_2, peroxyacetyl nitrate (PAN), formaldehyde (HCHO) and higher aldehydes, and nitrous acid (HONO)." These pollutants "are the major early morning sources of hydroxyl radicals (OH) which drive the oxidation processes involved in photochemical smog."

2. Along with ozone, a wide spectrum of hazardous components tends to be associated with photochemical smog episodes. The NCAQ expert panel also expressed concern that higher NOx emission rates would lead to higher ambient concentrations "of other nitrogen bearing pollutants, e.g., NO_2, nitric acid, peroxyacetyl nitrate (PAN), and other nitrates." These latter compounds are traditionally associated with ozone as part of the photochemical smog family.

3. NOx control will also reduce ozone concentrations downwind in transport situations; since many densely populated areas of the United States are "downwind" of other urban centers, NOx and HC control seems the only

reasonable course of action to protect public health.

As pointed out by the California Air Resources Board in a study which supported that state's adoption of a 0.4 gpm NOx standard for passenger cars, light duty trucks and medium duty vehicles just a few months ago, "Since 1978, a period during which both HC and NOx emissions have decreased, daily peak smog season ozone levels have declined significantly in both the central and eastern portions of the basin. It is in these areas that ozone concentrations are the highest and affect the health of both sensitive and healthy individuals."

E. Other

While nitrogen dioxide alone does not significantly reduce visual range, it is responsible for a portion of the brownish coloration observed in polluted air. In addition, nitrogen dioxide and particulate nitrates also contribute to pollutant haze.

Oxides of nitrogen have also been shown to effect vegetation adversely. This effect is even more pronounced when nitrogen dioxide and sulfur dioxide occur simultaneously. Further, nitrogen dioxide has been found to cause deleterious effects on a wide variety of textile dyes and fabrics, plastics and rubber.

In the face of (a) an annual average nitrogen dioxide air quality picture which probably will worsen over the next two decades even with existing automobile nitrogen oxides controls, (b) a growing consensus that short term nitrogen dioxide levels which tend to be dominated by mobile sources may be even more of a health concern than annual average exposures, (c) the negative role of nitrogen oxides in contributing to the photochemical oxidant problem, (d) the impact of nitrogen oxides on visibility and (e) the emerging concern with acid deposition and the growing awareness of the role which nitrogen oxides plays in its formation, the only reasonable conclusion seems to be that nitrogen oxides control to the level of technological feasibility is warranted. This conclusion was reinforced by the latest EPA air quality and emissions trends report which shows that national nitrogen oxide emissions increased by 600,000 metric tons from 1983 to 1984; from transportation sources alone, it increased by about 100,000 tons.

2. Diesel Particulate

Uncontrolled diesels emit approximately 30 to 70 times more particulate than gasoline-fueled engines equipped with catalytic converters and burning unleaded fuel. These particles are a concern from several standpoints:

1. Many areas already experience unhealthy air quality levels for total suspended particulate (TSP) matter. Most TSP comes from stationary sources but diesels contribute. These particles in urban air are of concern because a strong correlation between suspended particulate and variations in infant mortality and total mortality rates has been established. Further, clear evidence emerges from the body of epidemiological literature that implicates particles in aggravating disease among bronchitics, asthmatics, cardiovascular patients and people with influenza. Any significant increase in diesel particulate emissions would add to the difficulty of solving this problem.

2. Beyond the overall impact on TSP, diesel particles raise a special health concern because they are very small (averaging about 0.2 microns in size). Small particles, which are much more likely to be deposited in the deepest recesses of the lung (alveolar region) and which require much longer periods of time to be cleared from the respiratory tract, have a greater potential to adversely affect human health than larger particles. In addition, when emitted, they remain suspended in the air near the breathing zones of people for long periods of time. For these reasons, the Harvard University Health Effects Project recently concluded that "particulate pollution should be a public health concern because, even at current ambient concentrations, it may be contributing to excess mortality and morbidity. Furthermore, our recent analyses...indicate that fine particles (FP) and sulfates (SO_4) are among the most harmful particles to public health."

3. In addition, diesel particulate has also been singled out as especially hazardous and toxic because of its composition. As noted in the Harvard project "most of the toxic trace metals, organics, or acidic materials emitted from automobiles or fossil fuel combustion are highly concentrated in the fine particle fraction". The U.S. EPA has noted that up to 10,000 chemicals may be adsorbed on the surface of diesel particles and drawn deep into the lung with them. Many of these chemical compounds are known to be mutagenic in short term bioassays, and to be capable of causing cancer in laboratory animals. Based on an exhaustive multiyear program of in vitro and in vivo studies by EPA and others focusing on the comparative potency of diesel particulate with other known human carcinogens, EPA estimated the risk to range from 0.26×10^{-6} to 1.4×10^{-6} lung cancers per person per year due to a constant lifetime exposure to one microgram per cubic meter of diesel particulate. Since total national urban exposure to diesel particulate in the United States is estimated to range from 3 to 5 micrograms per cubic

meter by 1995, it is easy to see why this has been a cause of great concern.

Other, epidemiological studies have tended to reinforce these concerns. For example, a 1983 study of heavy construction workers found positive trends in lung cancer by length of union membership and a higher than expected rate among retirees. Further, a pilot study of U.S. railroad workers, conducted by researchers at Harvard, indicated that the risk ratio for respiratory cancer in diesel exposed subjects relative to unexposed subjects could be as great as 1.42, i.e., the possibility of developing cancer may be 42 percent greater in individuals exposed to diesels than in individuals which are not exposed. The follow up study which has now been completed appears to be equally alarming - "Using multiple logistic regression to adjust for smoking and asbestos exposure, workers age 64 or less at the time of death with lung cancer had increased relative odds (1.2-1.4, p less than 0.05) of having worked in diesel exhaust exposed jobs."

During late 1985, the results of several new studies were presented which increased concerns regarding adverse health effects from diesel particulate emissions. In particular;

1. Stoeber (Fraunhofer Institute) reported on carcinogenicity in rodents after long term high dose diesel inhalation. On both mice and rats, malignant tumors increased with exposure to diesel exhaust. With the mice, however, gaseous phase emissions seemed most important whereas with the rats the particles seemed to be the main cause.
2. Brightwell (Battelle-Geneva) reported that unfiltered diesel exhaust produced an increase in lung tumor incidence from 1% to 40%; gasoline emissions reportedly showed no effect.
3. In a summary presentation, McClellan (Lovelace) described the issue as no longer whether diesel exhaust is carcinogenic but rather under what conditions and how much.

Based on the earlier studies as well as these new results, it continues to seem prudent to conclude that diesel particulate results in a significant cancer risk. In addition, other health problems such as aggravating disease among bronchitics, asthmatics, cardiovascular patients and people with influenza. which are related to particulates in general, especially small particles such as diesels emit, continue to be a reason to lower emission rates.

4. Beyond the adverse health effects, diesel particles are a nuisance. They degrade aesthetics and material usage through soiling and may contribute directly, or in conjunction with other pollutants, to structural damage by means of corrosion or erosion.

5. They also contribute to impaired visibility. Because of their composition (primarily carbon based) and size (in the size range of 0.2 microns), they are very high light absorbers and scatterers and therefore have the potential to be especially harmful to visibility.

6. Finally, exhaust odor from diesel buses has been a significant public concern for many years. Problems associated with diesel odor include "nausea, headache, and coughing; upsetting of sleep, irritation of eyes, nose and throat; and destruction of the sense of well-being and enjoyment of food, home, and external environment."

3. Carbon Monoxide

While great progress has occurred in reducing ambient CO levels across the United States, the problem is far from resolved. As Attachment 3 illustrates, about 85 of our major metropolitan areas currently exceed the carbon monoxide air quality standard.

II. Feasibility

Opponents of this bill argue that even if the standards were needed, they are not technologically feasible. This argument seems particularly suspect in that many vehicles already achieve these levels; for most others, either EPA or California have adopted the requirement after finding that they are technologically feasible. In a few cases, while not adopted by either EPA or California, they have found them to be feasible. Each specific standard is listed below.

Vehicle Type	LDV	LDT	HDGV	HDDV
CO	1.3	3.0	2.5	1.7
HC	0.16	0.19	0.48	0.54
NOx	0.25	0.5	5.1	5.1
Particulate*	0.18	0.18		0.25 0.10**

* Diesels Only
** Urban Buses Only

III. Passenger Cars - LDV

Passenger car and light truck control to the degree recommended in the Bill is feasible and is actually being achieved by many individual vehicles today. Looking at the pollutants individually, as I was asked to do by the Committee, about one out of four meets the standards contained in the Bill on a pollutant by pollutant basis. In combination, there are an almost infinite variety of combinations which can be looked at. The Table below summarizes specific combinations of emissions from certification cars based on the 1986 EPA and CARB certification data.

Standard (s) NOx/HC/CO	Number of Cars	Percentage
0.4	326	57%
0.25	163	28%
0.25/0.25	138	24%
0.25/0.25/2.5	116	20%
0.25/0.20/2.5	78	14%
0.25/0.16/2.5	40	7%
0.25/0.16/1.5	26	5%
0.25/0.16/1.3	18	3

It clearly shows that much tighter NOx levels than are required are currently achievable. For example, of 576 engine families certified, over 300 were at or below 0.4 NOx, and this is without any requirement that they achieve this low level. Over 175 were below 0.25 NOx; almost 150 simultaneously below 0.25 HC and 0.25 NOx.

Based in part on these data and the critical need for more NOx control, earlier this year, the California Air Resources Board determined that 0.4 NOx for passenger cars was necessary and feasible and cost effective.

IV. Light Trucks up to 8500 lbs - LDT

As indicated above, passenger cars currently achieve much lower levels than they are required to. Light trucks are in most characteristics very similar if not identical to cars; therefore, they should be able to apply the same technology..

A review of the latest certification data supports this view. In fact, over 70% of all light truck models certified for 1986 (184 of 261 engine families) certified at or below 0.41 HC. This encompassed vehicles from all size and weight categories and included both gasoline and diesel fueled. Over 50% certified below 0.3 grams per mile. Other possible combinations are illustrated below.

Standard (s) HC/NOx/CO	Number of Light Trucks	Percentage
0.5	214	82%
0.41	184	70%
0.30	139	53%
0.25	111	43%
0.25/1.0	90	34%
0.25/0.70	71	27%

0.25/0.50	34	13%
0.25/0.50/5.0	26	10
0.25/0.50/4.0	14	5%
0.25/0.50/3.0	8	3%

V. Light Duty Diesel Particulate.

In this area, in my judgement, the Bill is weaker than it should be considering the strong public health need for diesel particulate control. The State of California has adopted a standard of 0.08 grams per mile to go into effect in 1989 and this standard is already being achieved by certain Mercedes cars equipped with particulate trap oxidizers. When EPA first adopted the 0.2 gram per mile particulate standard in 1980, it expected that most vehicles would require the use of these traps to meet the standard. Engine controls have exceeded EPA's expectations, indicating once again how well auto industry engineers are able to respond when faced with a difficult challenge. However, trap technology has also been coming along (as proven by the first generation Mercedes systems) and the emissions rates which are still much higher than from gasoline fueled vehicles should be lowered to reflect these developments.

VI.Heavy Duty Trucks

Many medium trucks (8500-14,000 lbs. GVW) are still gasoline fueled and these will need to be equipped with oxidation catalysts by 1987 to achieve the Bill's HC and CO standards. In my judgement, it is possible to further lower the NOx standard to 1.7 grams per brake horsepower hour for these vehicles. Adoption of a 1.7 NOx standard will require the use of the already proven 3-way catalyst technology to these engines instead of oxidation catalysts. As noted by EPA in 1981, "It is the staffs judgement that achievement of the full 75 percent reduction, i.e., a reduction to the level of the 1.01 g/BHP-hr emission target level, is technologically feasible through the application of three way catalyst technology, and certainly if used in conjunction with oxidation catalysts to maintain the 90 percent HC and CO reductions. Additional NOx control, if necessary, could also be provided by EGR." (see page 59 of 1981 Regulatory Analysis, Attachment 8)

The diesel truck NOx standard can also be reduced below the level in the Bill though not yet to the same level which is feasible for gasoline trucks. Some trucks are already certifying below 4 grams per brake horsepower hour and with the use of methanol levels close to 2 seem feasible.

It is important to note that any engines unable to achieve stringent truck requirements very quickly could still be sold with non conformance penalties. The alternative of setting the standard at the level the poorest engines can achieve is inconsistent with the health and welfare need for maximum feasible control and with the concept of basing standards on the level achieved by the technological leader not the technological laggard. This philosophy has guided the nation in forcing technological developments for HC, CO, NOx and particulates from cars. If we have learned only one thing from the Clean Air Act, it should be that greatest progress occurs when stringent standards with firm deadlines are adopted.

VII. Regulation of Sulfur in Diesel Fuel

The Bill would also limit the sulfur content of any motor vehicle diesel fuel to the level achieved by gasoline; in the short term, a maximum of 0.05 percent by weight would be required.

Just recently the issue of reducing sulfur in diesel fuel was analyzed by a contractor for EPA and it is appropriate to summarize some of the conclusions here:

1. Reducing fuel sulfur would reduce SO_2 emissions and the sulfate fraction of diesel particulates, and would indirectly reduce ambient levels of sulfate particles and acid deposition.
2. It is feasible to reduce the sulfur from current levels of about 0.3% to 0.05% without reducing fuel availability or refinery modification.
3. Some reduction in diesel fuel aromatic content would tend to result automatically from the changes introduced to reduce diesel fuel sulfur.
4. Based on limited data, it appears that the maintenance savings due to the sulfur reduction would be about four times the increased refining costs needed to bring it about.

California has already adopted regulations requiring low sulfur diesel fuel (0.05%) in the South Coast Air Quality Management District.

I hope this information is helpful to the Committee. I would be happy to respond to any questions you might have at this time.

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Attachment 1: Worldwide Motor Vehicle Emissions Regulations

Country	TECHNOLOGY CATEGORY			
	I	II	III	IV
Algeria	xx			
Australia		my75	MY86	
Argentina	xx			
Austria		my72		MY89
Belgium		my73		ECE
Brazil		my78	my92	my97
Bulgaria	xx			
Canada		my70		MY88
Chile	xx			
China	xx			
Colombia	xx			
Czechoslovakia		my80		
Denmark		my73		ECE
E. Germany		my80		
Egypt		my80		
Finland		my75		MY89
France		my72		ECE
Greece		my76		ECE
Hong Kong		MY80		
Hungary		my80		
India	xx			
Indonesia		xx		
Iran	xx			
Ireland		my74		ECE
Israel		xx		
Italy		my73		ECE
Japan		my69	my75	my78
Kuwait		xx		
Luxembourg		xx		ECE
Malaysia		xx		
Mexico		xx		
Morocco	xx			
Netherlands		my73		ECE
New Zealand		xx		
Nigeria	xx			
Norway		my77		my90
Peru	xx			
Phillipines	xx			
Poland		my80		
Portugal		my83		ECE
Puerto Rico		my70	MY75	MY81
Rumania		MY80		
Saudi Arabia		xx		
Singapore		my80		
So. Africa	xx			
So. Korea		my80		my88
Spain		my84		ECE
Sweden		MY76		MY89
Switzerland		MY74	MY87	MY88
Taiwan		my87	my91	my94
Thailand		xx		
Turkey		xx		
UK		MY84		ECE

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Attachment 1: Worldwide Motor Vehicle Emissions Regulations

USA		MY68	MY75	MY81
USSR		MY80		
Venezuella	xx			
W. Germany		MY73		ECE
Yugoslavia	xx			

Notes:

xx	means the actual date of implementation is unknown
ECE	means the ultimate date of adoption of tighter standards will be determined by the common market Final agreement has been elusive but the majority favor the following schedule above 2 liters IV by 1989 from 1.4 to 2 liters III by 1993 under 1.4stays tech II for the forseeable future
Tech I	means virtually uncontrolled
Tech II	engine modifications only
Tech III	Oxidation catalysts on many vehicles
Tech IV	Three way catalysts on many vehicles

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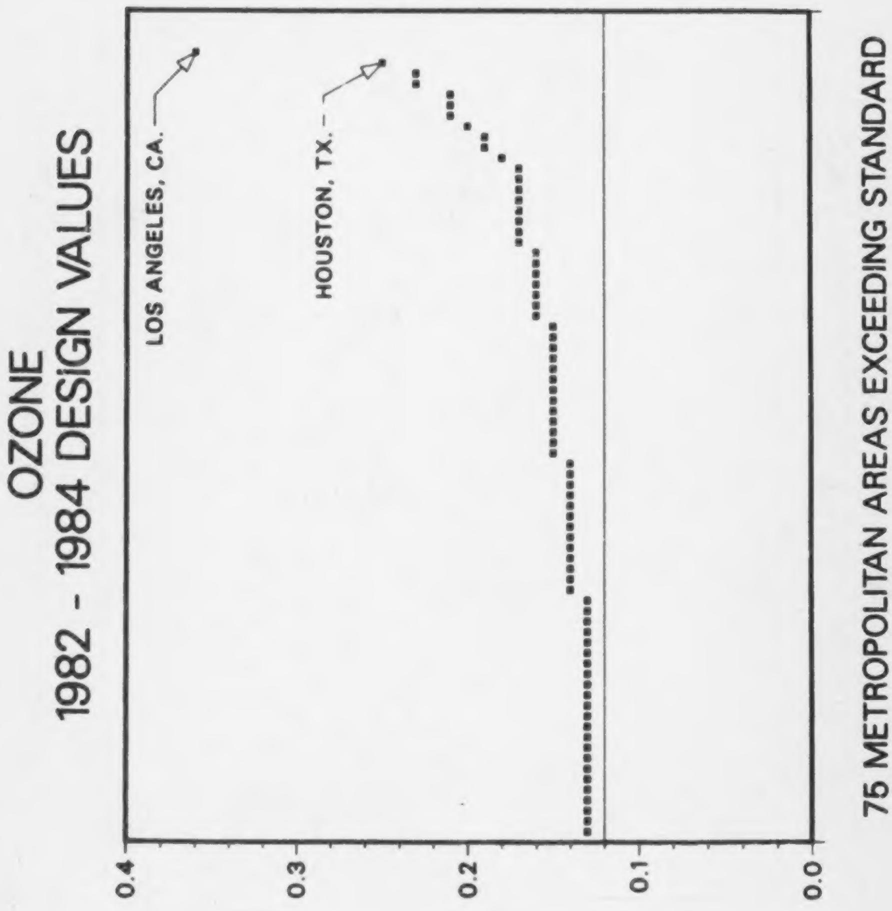
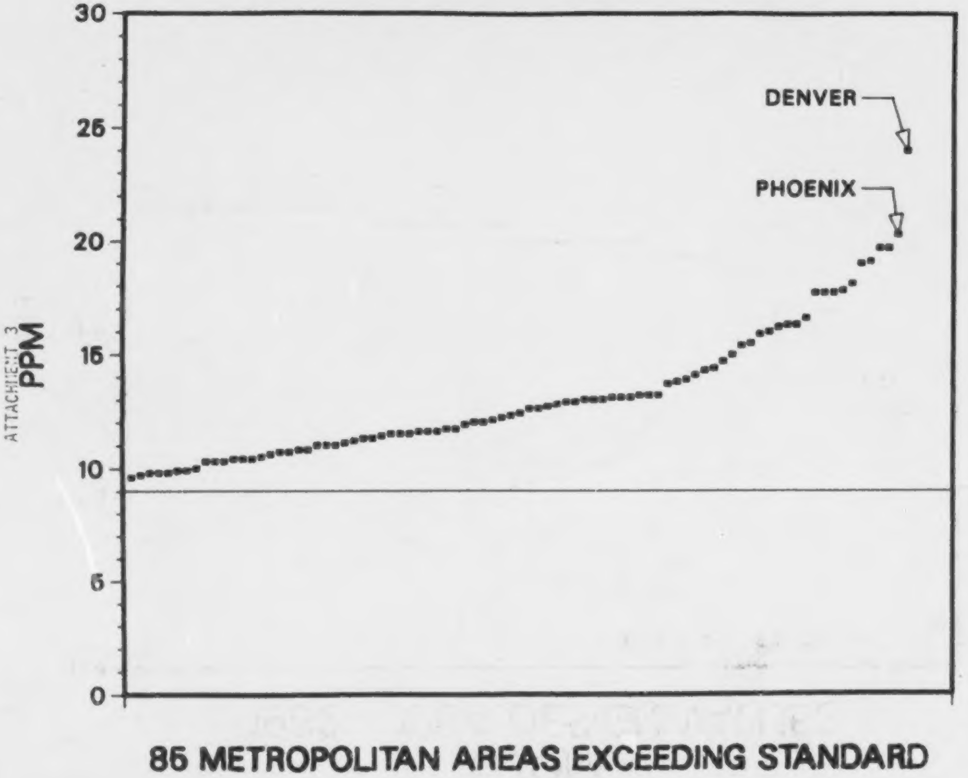


ATTACHMENT 2

ATTACHMENT 3

CARBON MONOXIDE
1982 - 1984 DESIGN VALUES



[illegible] Air and Water

Testimony of John R. Bartlit
State Chairman, New Mexico Citizens for Clean Air & Water
in Support of S.2203, The New Clean Air Act

before the

Committee on Environment and Public Works
U.S. Senate
Washington, D. C.
September 30, 1986

INTRODUCTION

My name is John Bartlit. I am State Chairman of New Mexico Citizens for Clean Air & Water, a statewide organization of some 1000 members concerned about the environment. I hold a doctorate in chemical engineering from Yale University and have been closely involved since 1969 in issues of industrial air pollution, especially pollution from New Mexico's two largest sources -- copper smelters and coal-fired power plants. I was a member of the Environmental Advisory Committee to the Federal Energy Administration, also Environmental Vice-Chairman of the Air Pollution Task Force of the National Coal Policy Project -- a joint industrial-environmentalist effort under the auspices of the Georgetown University Center for Strategic and International Studies. I was the 1985 winner of the Clinton P. Anderson Award from the American Lung Association of New Mexico.

AMERICANS PUT A HIGH VALUE ON LONG-RANGE VISIBILITY

Good morning. I bring you special views from the West. You will see that the importance of these vistas is much of what I have to say today. Despite damage by acid rain and health loss to the sensitive, I still believe the skeptic will find the most convincing and costly harm from air pollution in the West is its damage to long-range visibility. For example, a careful study by the Institute of Policy Research, University of Wyoming, showed Americans were willing to pay $5.8 billion annually (1980$) just for the protection of this visibility[1] (Summary attached). All similar studies of which I am aware, including those by utilities, support a similar conclusion, both for inside major parks as well as the much wider living areas of the West, even cities.

VISIBILITY DEGRADATION/ACID RAIN ARE ONE ISSUE

Visibility loss has the same cause as acid rain, namely emissions of sulfur (SO$_2$) and nitrogen oxide (NO$_x$). The particular causes are well-established. #1 is sulfates, from SO$_2$ emissions of copper smelters, coal-fired power plants, and smaller urban sources; and #2 is nitrates, from power plants and urban autos together with the accompanying hydrocarbons from autos. Evidence for this is voluminous[2-4]. By industry's own admission, the offending sources on some days degrade visibility only locally and on other days they degrade visibility out to hundreds of miles from the source, depending on atmospheric layers and currents.

With the causes known, the cure is obvious -- reduce emissions from the sources. Thus acid rain and visibility degradation have the same cause and the same cure. They are the same issue. They can be solved as one.

MOST VISIBILITY IS NOT PROTECTED BY CURRENT LAWS

Except for sparse Class I areas, current state and federal laws do not pursue, and in fact prohibit, the protection of long-range visibility. Ambient air quality standards are set at levels that correspond to 12 mile average visibility. To the general observer or newcomer to these issues, my statement may seem so unreasonable that I will devote a moment to the proof and history of this uncontested fact.

For particulate matter (such as fly ash, or solid sulfates and nitrates from SO$_2$ and NO$_x$), legally allowed levels to protect welfare (secondary standards) are set at a yearly average of 60 micrograms per cubic meter. According to the U.S. Air Quality Criteria Document for Particulate Matter[5] (see Appendix B)* this pollutant level, if allowed everywhere, corresponds to visibility of only 12 miles on most days (See Fig. 3-7, Appendix B).* This means a mountain or land feature could be invisible from 15 miles away half the time and still be considered legally acceptable air quality.

You may ask who would ever consider this acceptable? The answer is people living in St. Louis in the mid 1960's. Fig. 7-1 (see Appendix B)* shows the results of pulbic opinion polls taken at that time and place. The polls showed that only 70% of the people were even aware of any pollution when it cut visibility to 5 miles, and only 30% cared that the visiblity was that poor. Surely those feelings in St. Louis in the '60's are far from representative of feelings about visibility in deserts and mountains of the Southwest today. Yet the roots of today's 60 microgram standard lie directly in the study cited and similar ones of the same era taken in Birmingham, Memphis, and Buffalo. Current ambient standards were never designed to protect the immensely valuable vistas of the West.

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*Appendix B has been retained in committee files.

Visibility is the most easily damaged public value. It is demonstrably damaged by lesser amounts of pollutants than is health or vegetation. It follows that for all criteria pollutants, except invisible CO, protection of long-range visibility will assure adequate protection of all other health and welfare values. Visibility is the key.

STATES CANNOT ACT. A large measure of Washington thought, increasingly so in the Reagan years, has said the feds should set minimum rules and leave control of unique local aspects to the locals. Let the West protect its unique vistas.

States have responded with a hearty "no thank you". By passing state laws prohibiting air rules more stringent than federal rules, most states have replied, "No, it must be done nationally to be effective."

For example, New Mexico statutes say (in Section 74-2-5, NMSA 1978) that state air rules "shall be no more stringent than...the federal act and federal regulations..." in protecting visibility. A recent study found 34 states had similar legal language which in some aspect limited air rules to federal requirements.

These limiations gain importance when federal decision-makers leave action to the states. Last October 25, 1985, Secretary of the Interior Donald Hodel declined to designate any "integral vistas" around our national parks for special protection of visibility. Among the keystones of Hodel's defense for his inaction was the argument: "Most states already have the discretion to identify and protect vistas. That means that states can achieve the goal of visibility protection without additional regulations by the Department of the Interior." Meanwhile back in New Mexico, where visibility is uniquely valuable, we have no discretion. Exercise of discretion is forbidden by law.

Visibility protection has been caught in a Catch 22, with statesmoving to say they can choose nothing but what the feds demand while the feds move to say they won't make demands so the states can decide. This impasse can be resolved through effective, reasonable legislation by Congress, like S.2203 I came to support.

NOX -- A POLLUTANT LEFT BEHIND

Others will address the importance of SO_2, ozone, and reactive hydrocarbons. I wish to focus on NO_x. In the 1970's, attention to stationery sources centered on particulates and SO_2. Now it's time to move aggressively against NO_x.

NO_x impacts visibility in two ways. First, emissions of colorless NO from smokestacks react quickly with air to produce the strongly red-brown colored gas, NO_2. After stack cleanup of dense particulate and white SO_x, the red-brown color of NO_x becomes painfully obvious. This has been experienced at New Mexico power stations since the improvements in ash and SO_2 controls. NO_x emissions from such plants of several hundred tons per day per plant are typical. This is comparable daily tonnage to previous emissions of ash, and of SO_2.

The second way NO_x hurts visibility is by further conversion in air to form solid nitrates. These are fine particles that scatter light and cause white haze in an otherwise blue sky, the same as ash and solid sulfates do. This reaction occurs away from the plant, contributing to obscuration by regional haze rather than well-defined stack plumes. It occurs at concentrations allowed by current law. The contribution of NO_x to acid rain is, of course, also well known and documented.

THE BEST VISIBILITY PROTECTION IS WITH BEST TECHNOLOGY

Almost any development will do some harm to visibility. How best to balance the conflicting industrial and environmental needs of society? I believe the answer to be succinctly stated as follows:

"The key to balance in environmental and economic interests (under non-degradation) is new technology. There will be doomsayers who say 'This can't be done.' Non-polluting technology offers the way out of this impasse. Technological advances are not a pipe dream."

Those were the words of friend and fellow New Mexican, long-time Committee member, Senator Pete Domenici, spoken October 14, 1978, at Waterflow, NM, to a gathering we each addressed--the dedication ceremony for high-efficiency sulfur scrubbers at the San Juan Generating Station of the Public Service Company of New Mexico. Those words were true then. They are equally true today regarding NO_x control technology.

Today's emission rules for NO_x are ten years old. Technology has advanced, both here and abroad. As a professional engineer, I am always struck by the wide disparity between the tenor of technology at legislative hearings and that heard at technical symposia for the practicing engineer. Once again, I suspect few developers of NO_x controls will step forward to testify vigorously about advances for fear of being blackballed by their industrial customers, as happened with ash and sulfur control suppliers a decade ago.

Everyone has heard much about the excellent Japanese progress with Selective Catalytic Reduction(SCR) technology of NO_x. In addition, other technologies also far superior to today's requirements have been reported in other forums. Okigami[6] reports on a three stage combustion technique which produces exhaust gas concentrations of 100-150 pppm of NO_x. Investigators with RocketDyne[7] report on a new burner which achieves 100 ppm NO_x exhaust gas concentrations which the investigators think could reach levels of 50 ppm in the exhaust gases. Marakami[8] reports that the Mitsubishi Advanced Combustion Technology can reach levels between 50 and 150 ppm in the exhaust gases. Other investigators [9,10] report significant NO_x control with sodium based additives in conjunction with fabric filters.

Perhaps the single most convincing brief statement I could make about available NO_x technology is this: In 1981, the technical staff for the California Air Resource Board [11] concluded that 80% control of NO_x emissions from new coal-fired power plants was both technically and eocnomically available. The CARB guidelines called for NO_x emissions to be held to less than 0.09 lbs/mmBTU for units operating at over 50% capacity. The staff concluded that NO_x controls would cost $42 to $66/kw installed, with levelized costs of 4.4 to 6.5 mills/kwh. They estimated somewhat higher costs for SO_2 controls.

CONCLUSION

Technological advances are not a pipe dream. But they will not be used to balance industrial and environmental needs unless required by federal law. I support S.2203 for its reasonable balance, for its national application, for its pursuit of technological solutions, and for its resultant help in protecting the valuable vistas of the West consistent with industrialization.

Obviously, for its lack of national application, S.2813 does nothing to help the problems I have journeyed here to document.

Thank you for the opportunity to do so.

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-APPENDIX A-

DRAFT

METHODS DEVELOPMENT FOR ENVIRONMENTAL CONTROL BENEFITS ASSESSMENT

Volume VIII

THE BENEFITS OF PRESERVING VISIBILITY IN THE NATIONAL PARKLANDS OF THE SOUTHWEST

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ABSTRACT

The nation needs to know how much visibility is worth in order to evaluate the benefits of air pollution control for the purpose of visibility protection. This study was designed to measure the economic value of preserving visibility in the National Parklands of the Southwest. During the summer of 1980, over six hundred people in Denver, Los Angeles, Albuquerque and Chicago were shown sets of photographs depicting five levels of regional visibility (haze) in Mesa Verde, Zion and Grand Canyon National Parks. Although our calculations suggest that projected emissions with existing and currently planned SO_2 controls would not produce a perceived decline in visibility, complete decontrol of SO_2 emissions by projected power plants in the region in 1990 would result in a decrease in typical summer visibility from that which was represented in the photographs as "average" visibility to that which was represented as "below average" visibility. On the basis of this, the survey participants were asked how much they would be willing to pay in higher electric utility bills to preserve the current average condition--middle picture--rather than allow visibility to deteriorate, on the average, to the next worse condition as represented in the photographs (an estimate of total preservation value). They were also asked about their willingness to pay in the form of higher monthly electric power bills to prevent a plume from being seen in a pristine area. To represent plume blight, two photographs were taken from Grand Canyon National Park, one with a visible plume. The surveying had a very high response rate (few refusals). Individual household bids ranged from an average of $3.72 per month in Denver to $9.00 per month in Chicago for preserving visibility at the Grand Canyon. These average bids were increased by $2.89 to $7.10 per month per household in the four cities if visibility preservation was to be extended to the Grand Canyon Region as a whole as represented by the photographs taken from Mesa Verde and Zion. Prevention of a visible plume at the Grand Canyon was worth on the average between $2.84 and $4.32 per month for the four cities surveyed. Extrapolating these bids to the nation implies that preserving visibility in the Grand Canyon Region is worth almost 6 billion dollars per year. This is the base figure from which the benefits of power plant SO_2 controls, projected to be in place in the region in 1990, are determined. Adjusting this number for 1990 population levels and using a 10 percent discount rate over a thirty year power plant life gives an annualized value of 7.6 billion dollars as the benefits of power plant SO_2 control. The corresponding control costs are estimated to be approximately three billion dollars annually. Therefore, the existing and proposed control level in the Region is not without economic justification. Additionally, prevention of a visible plume at the Grand Canyon is worth almost two billion dollars to the nation. These results suggest that preservation values derived from knowledge that a unique natural wonder remains preserved may be very large for the Grand Canyon Region. Finally, the methodology used must be considered experimental since this is the first study, to our knowledge, to include an estimate of preservation value for a unique national treasure.

DRAFT

EXECUTIVE SUMMARY

THE BENEFITS OF PRESERVING VISIBILITY IN THE NATIONAL PARKLANDS OF THE SOUTHWEST

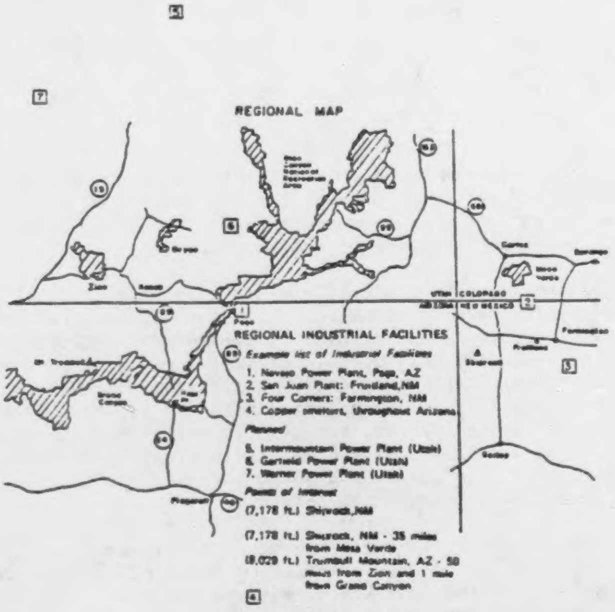
The nation needs to know how much visibility is worth in order to evaluate the benefits of air pollution control for the purpose of visibility protection. This study was designed to measure the economic value of preserving visibility in the National Parklands of the Southwest.

Historically Americans have placed a high value on good visibility, that is, the ability to see distant objects clearly. This yearning for and appreciation of atmospheric visual clarity is evidenced in the country's early literature and art, including the Journals of Lewis and Clark as well as the masterpieces of the great American landscape artists of the 19th century. Today that love of visibility is demonstrated not only by the millions who flock each year to our western parks, but also in the high prices brought by those artists' work of a century ago and by the interest in Ansel Adams' simple, yet dramatically clear black and white photographs of Yosemite and other wonders of the U.S. National Park Service.

Over the past 100 years, Congress has acted to preserve many of our nation's natural wonders. It did so by creating and continually expanding the National Parks, National Wilderness Areas, National Monuments, National Recreation Areas, and Wild and Scenic Rivers.

Since the 1950s there seems to have been an increasing concern that this beauty is threatened by industrial development and population growth. Pollution from coal-fired power plants became a special concern with the advent in 1963 of the first unit of the Four Corners Power Plant near Farmington, New Mexico. It produced a plume that could be seen clearly for many miles, reducing the clarity of the visual experience in areas of northwestern New Mexico, southeastern Utah, southwestern Colorado and northeastern Arizona.

By the late 1960s and the early 70s, smog began to appear in Yosemite Valley on warm summer days. Battles erupted over proposed coal-fired power plants on the Kaiparowits Plateau and near Capitol Reef National Park, both in southern Utah, because of their possible effects on visibility. The increased publicity and concern resulted in magazine and newspaper articles decrying the loss of visual clarity, particularly in the western United States, and precipitated political pressures in Congress for legislative steps to protect visibility. Those pressures culminated in the August 1977 adoption by Congress of the nation's first specific visibility protection requirements for national parks and national wilderness areas as amendments to the Clean Air Act of 1970. One of the large issues raised by these developments is whether the value of visibility protection outweighs the cost, including air pollution control equipment and the regulatory requirements. The study reported on here is designed to improve our ability to measure the benefits of visibility and to provide some actual estimates of the value of that visibility in several major national parks and for the region in which they are located. The region and the parks located in it are shown on the map below. We refer to this area as the Grand Canyon Region.


REGIONAL MAP
5
7
6
15
89
160
666
95
Zion
Bryce
Glen Canyon National Recreation Area
Cortez
Durango
Mesa Verde
UTAH COLORADO
ARIZONA NEW MEXICO
1
2
Page
Farmington
Fruitland
Shiprock
3
Grand Canyon
Gallup
Flagstaff
64
89
REGIONAL INDUSTRIAL FACILITIES
Example list of Industrial Facilities
1. Navajo Power Plant, Page, AZ
2. San Juan Plant: Fruitland, NM
3. Four Corners: Farmington, NM
4. Copper smelters, throughout Arizona
Planned
5. Intermountain Power Plant (Utah)
6. Garfield Power Plant (Utah)
7. Warner Power Plant (Utah)
Points of Interest
(7,178 ft.) Shiprock, NM
(7,178 ft.) Shiprock, NM - 35 miles from Mesa Verde
(8,029 ft.) Trumbull Mountain, AZ - 50 miles from Zion and 1 mile from Grand Canyon
4

Visibility is the ability to clearly see both color and detail over long distances. Human perception of visual air quality is associated with the apparent contrast of distant visual targets with respect to their surroundings. As contrast is reduced, a scene "washes out" both in color and in the ability to see distant detail.

What then is the nature of the preservation value of visibility? That value has at least two possible components.

First, a scenic resource such as the Grand Canyon attracts millions of recreators each year. The quality of the experience of these recreators depends in great part on air quality, because scenic vistas are an integral part of the Grand Canyon "experience." Thus, air quality at the Grand Canyon is valuable to recreators. We might call this economic value user value, or the willingness to pay by users for air quality at the Grand Canyon. Thus, recreators in the National Parklands of the Southwest should be willing to pay some amount to preserve air quality for each day of their own use if their recreation experience is improved by good air quality. One hypothetical market for collecting user value is an increase in entrance fees to parks to be used to finance preservation of air quality, i.e., purchase of air pollution control equipment. Survey questionnaires can be designed to estimate user value based on such a hypothetical market.

The second component of preservation value is termed existence value. Individuals and households which might never visit the Grand Canyon can still value visibility there simply because they wish to preserve a national treasure. Visitors also may wish to know that the Grand Canyon retains relatively pristine air quality even on days when they are not visiting the park. Concern over preserving the Grand Canyon may be just as intense in New York or Chicago as it is in nearby states and communities.

Thus, preservation value has two additive components, user value and existence value. However, it is difficult to construct even a hypothetical market to capture existence value alone. Rather one could imagine a lump sum fee added, for example, to electric power bills to preserve air quality in the Grand Canyon and the surrounding parklands. Such a hypothetical fee would capture total preservation value, the sum of existence plus user value, if used as the basis of a survey questionnaire. In fact, the survey conducted for this study asked approximately one-third of the respondents a pure user value question (how much would they be willing to pay in higher entrance fees per day for visibility at the Grand Canyon or other parks). The other two-thirds of the respondents were asked how much they would be willing to pay at most as a higher monthly electric power bill to preserve visibility first at the Grand Canyon and second throughout the region as represented by photographs of vistas at the Grand Canyon, Mesa Verde and Zion National Parks (total preservation value questions). Clearly, if total preservation value is much larger than total user value, then existence value must be large.

During the summer of 1980, over six hundred people in Denver, Los Angeles, Albuquerque and Chicago were shown sets of photographs depicting both clear visibility conditions and regional haze conditions. Each set consisted of 5 photographs ranging from poor to excellent visibility. The middle picture in each case approximated average visibility during the summer (the season of peak visitation). The vistas were 3 different views from the Grand Canyon, 1 view from Mesa Verde and 1 view from Zion. The 8 by 10 inch textured prints were placed on display boards, each vista a separate row, and each row arranged with 5 photographs from left to right in ascending order of visual air quality (i.e., photograph A = "poor" visibility and photograph E = "excellent" visibility).

The relationship between the five levels of visibility shown in the photographs to regional emissions can be summarized as follows: if (1) all controls on SO_2 for existing power plants in the region were removed; (2) proposed power plants (through 1990) in the region were to emit SO_2 at the maximum uncontrolled rate; (3) existing smelter emissions were held constant; and (4) particulate emissions remain at current levels, visibility would then decline from current average conditions (middle photographs) by one step to the level presented in the photographs just to the left of center. Thus, where the photographs can be described as representing "poor," "below average," "average," "above average" and "excellent" visibility, complete decontrol of

SO_2 emissions by projected power plants in the region in 1990 would result in a decrease in typical summer visibility from that which is represented in the photographs as "average" visibility to that which is represented as "below average" visibility. The calculations which form the basis of the relationship between the levels of visibility which were shown in the photographs and regional emissions are presented in Chapter 3.

The survey participants were asked either (1) how much they would be willing to pay for visibility as shown in the five sets of photographs from worst to best on the day of a visit to the Grand Canyon (an estimate of user value) or (2) how much they would be willing to pay in higher electric utility bills to preserve the current average condition--middle picture--rather than allow visibility to deteriorate, on the average, to the next worse condition as represented in the photographs of the Grand Canyon or of the region (an estimate of total preservation value). They were also asked about their willingness to pay in the form of higher monthly electric power bills to prevent a plume from being seen in a pristine area. To represent plume blight, two photographs were taken from Grand Canyon National Park. Both photographs are essentially identical except one has a plume, a narrow gray band, crossing the entire vista in the sky. The source was not industrial or municipal pollution but a controlled burn in the area around the Grand Canyon. However, the effect was comparable to what a large uncontrolled industrial source might produce.

The bidding game reveals the household's willingness to pay for preserving visibility in specific locations as represented in the photographs. For the interviewees asked the preservation value questions in the survey, the bids include both existence value and user value. Therefore, we concentrate on the preservation value section of the survey here, since user values are included in the preservation estimates.

The surveying had few refusals, partly because of the nature of the interviews. Typically, interviews were conducted in the late afternoon or early evening hours in residential neighborhoods. Due to the large size of the display boards, most interviews were conducted on the front lawn of the respondent's home. Often, both husband and wife participated jointly in answering the questions. This was viewed as appropriate since the principal question was "how much would you be willing to pay in higher monthly electric utility bills to preserve visibility at the Grand Canyon or in the entire Grand Canyon region?" Household members would often engage in extensive discussion before giving a dollar amount. Individual bids ranged from an average of $3.72 per month in Denver to $9.00 per month in Chicago for preserving visibility at the Grand Canyon. These average bids were increased from $2.89 to $7.10 per month per household in the four cities if visibility preservation was to be extended to the Grand Canyon region as a whole. Prevention of a visible plume in the Grand Canyon was worth on the average between $2.84 and $4.32 per month for the four cities surveyed.

The validity of these survey results depends on the perception by individuals of visibility conditions as represented by photographs. A linear relationship has been shown to exist between perceived visibility as quantified by individuals in a numerical one to ten ranking of visual air quality as represented in an actual view and with the scientific measure of the apparent contrast in the vista by a multiwavelength teleradiometer. This close linear relationship between perception of an actual vista and the apparent contrast of the vista also extends to perception of visibility conditions represented by slides or 8" x 10" color photographs as is shown in the research presented in Chapter 4.

The benefit estimates derived from the interview results can be extrapolated from the sample population to the country as a whole by applying statistical extrapolation techniques to the results of the survey. The bids offered by interviewees to preserve visibility are statistically related to income as well as other demographic characteristics. Using the estimated linear relationship of bids to population characteristics, it is possible to estimate the value of benefits to residents both for the entire Southwest region and for the entire nation. This is done by substituting the average value for these characteristics for each state into the relationship and calculating the average value of the bid of a person in that state. This value is then multiplied by the number of households in the state to get a total bid or benefit.

When the analysis is performed for the southwestern U.S. (for residents of California, Colorado, Arizona, Utah, Nevada, and New Mexico), the following values are obtained.

Yearly Benefits from:	Total ($million)
Preserving Visibility at the Grand Canyon	470
Preserving Visibility at the Grand Canyon Region	889
Preventing Plume Blight at the Grand Canyon	373

To estimate the aggregate national benefits for preserving visibility, a similar analysis is done for the entire U.S. and the following values are obtained.

Yearly Benefits from:	Total ($million)
Preserving Visibility at the Grand Canyon	3,370
Preserving Visibility in the Grand Canyon Region	5,760
Preventing Plume Blight at the Grand Canyon	2,040

The benefits of preserving visibility can be related to emissions by noting the following. Projected emissions with existing and currently planned levels of SO_2 control would not produce a perceived decline in visibility in 1990 according to our calculations as shown in Chapter 3. However, complete decontrol of projected regional power plant emissions of SO_2 in 1990 would decrease visibility by approximately the same amount as the decrease shown in the photographs which form the basis of the preservation value questions in the survey. Thus, the regional benefit figure forms the base from which benefits from power plant SO_2 controls, projected to be in place in 1990, are calculated.

Two modifications of the regional benefit figure are necessary. First, benefits in 1990 must reflect the expected population levels in that year. Second, the present value of future benefits, based on a thirty year power plant life and a 10 percent real discount rate which is consistent with the Office of Management and Budget guidelines, must be determined. These modifications yield an annualized value of 7.6 billion dollars as the benefits of power plant SO_2 controls.

The corresponding control costs, which include initial capital expenditures, recurring expenditures and the regulatory system cost, are estimated to be approximately three billion dollars annually. Therefore, estimated national benefits exceed control costs and the proposed level of SO_2 control is not without some economic justification.

Several other observations on the outcomes of the analysis of the interview results are worth mentioning.

First, in the conventional view of the demand for environmental quality, there is a smooth tradeoff between higher successive levels of environmental quality and economic benefits, with successive units commanding less incremental willingness to pay.

The survey respondents in the user portion of the study, however, placed a much higher value on a small initial diminuation in visual clarity than on comparable subsequent decreases. This would produce a very unusual upward sloping demand curve for visibility.

Second, again somewhat contrary to expectations, neither past nor prospective visits to the Grand Canyon Region were shown to be important determinants of preservation value. On the average those who had never seen the Canyon valued it as highly as those who had.

Third, once more unexpected, distance from the region had no significant relationship to the size of household bids. People in Chicago bid fully as high as those closer by for preserving visibility at the Grand Canyon.

Fourth, whereas total annual preservation value of the Grand Canyon Region for the nation approaches six billion dollars, user value is on the order of tens of millions of dollars. Thus, existence value dominates the benefits of preserving visibility.

Because the Grand Canyon is the dominant feature in a region with many visitor attractions, one must be especially cautious in extending these findings to other recreational attractions. It seems likely that there are only a very few natural phenomena in the United States about which Americans have such strong feelings. Obvious candidates for this short list would be Old Faithful in Yellowstone National Park, Niagara Falls and perhaps a few others.

The main conclusion of this study is that the magnitude of the annual yearly benefits for preserving visibility when aggregated across households is impressive: nearly one billion dollars in the southwest and about six billion in the nation.

While these are necessarily rather crude extrapolations, the survey results reveal that Americans place great value on preservation of air quality in the Grand Canyon Region and that this valuation is not localized in the southwest. Again, it is worth noting that pure existence value overwhelms user value for the National Parks in the region.

The accuracy of these estimates, given the difficulty of quantifying environmental value in dollar terms, is probably on the order of plus or minus 50 percent. However, the methodology used must still be considered experimental.

The report is organized as follows: Chapter 1 presents the historical, legal and institutional background for visibility protection. Chapter 2 describes the photographs of vistas in the National Parklands used in surveying people in four metropolitan areas about the value of preserving visibility in National Parks. Chapter 3 relates the levels of air quality shown in the photographs to regional industrial emissions under three alternative scenarios. Chapter 4 reports on a study of the relationship between perception of air quality by direct observation as opposed to that presented in slides and photographs. Chapter 5 describes the economic theoretical basis for the survey design, which is presented in Chapter 6. Chapter 7 gives the survey results while Chapter 8 develops an aggregate benefit measure for preserving visibility in the National Parklands of the southwest. The overall study thus brings together work from atmospheric physics (Chapters 2 and 3), psychology and sociology (Chapter 4), and economics (Chapters 5-8) to provide an estimate of the benefits of preserving visibility in the Grand Canyon Region. Only with knowledge of (1) how emissions affect visibility, (2) how people perceive changes in visibility and (3) how people value changes in perceived visibility in dollar terms can a valid estimate of such benefits be made.

TESTIMONY OF
DR.HOWARD E. HEGGESTAD

CONCERNING THE EFFECTS OF OZONE ON CROP COMMODITIES

BEFORE THE

COMMITTEE ON
ENVIRONMENT AND PUBLIC WORKS
U.S. SENATE

HEARINGS ON S. 2203. "THE NEW CLEAN AIR ACT"

SEPTEMBER 30,1986.

MY NAME IS HOWARD E. HEGGESTAD. BEFORE RETIRING IN 1984 I SERVED AS RESEARCH PLANT PATHOLOGIST AT THE USDA AGRICULTURAL RESEARCH CENTER, BELTSVILLE, MD. WHERE I INVESTIGATED THE EFFECTS OF OZONE AND SULFUR DIOXIDE ON CROP YIELDS. I HOLD A PH.D. IN PLANT PATHOLOGY AND GENETICS FROM THE UNIVERSITY OF WISCONSIN AND HAVE SERVED ON MANY NATIONAL COMMITTEES CONCERNED WITH THE ASSESSMENT OF AIR POLLUTION DAMAGE TO CROPS. MY RESEARCH ON THE EFFECTS OF OZONE ON CROPS BEGAN IN 1958 WHEN WITH AN ASSOCIATE FROM THE UNIVERSITY OF CALIFORNIA, RIVERSIDE (DR. JOHN MIDDLETON) AND I DISCOVERED THAT OZONE WAS THE CAUSE OF DAMAGE TO TOBACCO LEAVES IN NORTHEASTERN UNITED STATES. SINCE RETIRING I HAVE CONTINUED TO WRITE MANUSCRIPTS FOR PUBLICATION IN PROFESSIONAL JOURNALS. I NOW SERVE, ALSO, AS A CO-CHAIRMAN OF THE NATIONAL CROP LOSS ASSESSMENT NETWORK (NCLAN) INTERNATIONAL CONFERENCE PLANNED FOR 1987.

I APPRECIATE THE OPPORTUNITY TO APPEAR BEFORE THIS COMMITTEE TO DISCUSS THE EFFECTS OF OZONE ON CROP YIELDS. I WOULD LIKE TO BRIEFLY SUMMARIZE MY STATEMENT AND ASK THAT THE ENTIRE STATEMENT BE ENTERED INTO THE RECORD.

OZONE PER SE WAS FIRST RECOGNIZED TO REDUCE CROP PRODUCTION IN 1957, ON GRAPES IN CALIFORNIA ALTHOUGH DAMAGE TO VEGETABLES DUE TO PHOTOCHEMICAL SMOG WAS RECOGNIZED IN THE L.A. BASIN ABOUT A DECADE EARLIER. IT HAS BEEN ESTIMATED THAT OZONE ALONE OR IN COMBINATION WITH SULFUR DIOXIDE AND NITROGEN DIOXIDE IS RESPONSIBLE FOR 90 PERCENT OF THE CROP LOSSES IN THE UNITED STATES DUE TO GASEOUS AIR POLLUTANTS. CURRENTLY THE GEOGRAPHIC REGIONS WITH HIGHEST OZONE CONCENTRATIONS ARE CALIFORNIA, THE NORTHEAST, TEXAS GULF COAST, AND THE CHICAGO AREA.

RECENT EPA ECONOMIC ESTIMATES (ADAMS ET AL, 1984) INDICATE $1.6 TO 1.9 BILLION BENEFITS TO AGRICULTURE PRODUCERS AND CONSUMERS IF OZONE CONCENTRATIONS WERE REDUCED 25% BELOW CURRENT AMBIENT LEVELS. CONVERSLEY, THERE WOULD BE A COST OF $1.9 TO $2.3 BILLION IF OZONE INCREASED BY 25%. NCLAN RESEARCH DATA SHOWING THE OZONE DOSE IMPACT ON YIELDS OF BARLEY, CORN, COTTON, SORGHUM, SOYBEANS, AND WHEAT WERE USED IN MAKING THE ASSESSMENT WHICH TRACED THE EFFECTS ON YIELDS THROUGH FINAL USE OF THE CROPS, BOTH DOMESTIC AND FOREIGN. LOSSES TO VEGETABLE, ORNAMENTAL, AND PERENNIAL CROPS, SUCH AS GRAPES AND APPLES, WERE NOT INCLUDED, NOR WAS DAMAGE TO FORESTS. CONSEQUENTIALY, ACTUAL LOSSES DUE TO OZONE DAMAGE TO VEGETATION COULD BE MUCH HIGHER. AN ANALYSIS OF POTENTIAL AGRICULTURE AND FORESTRY IMPACTS (SHRINER, ET AL, 1982) PREDICTED $3 BILLION BENIFITS ASSUMING A BACKGROUND OF CLEAN AIR TO BE 25 PPB OZONE. UNCERTAINTIES ABOUT OZONE IMPACTS ON CROPS WILL BE MUCH IMPROVED WHEN MORE IS KNOWN ABOUT OZONE CONCENTRATIONS IN THE THE AGRICULTURE PRODUCTION AREAS, ABOUT CROP VARIETY SENSITIVITY TO OZONE INDUCED YIELD LOSSES, AND ABOUT INTERACTIONS OF OZONE WITH OTHER POLLUTANTS, WITH PLANT PESTS, AND WITH PLANT STRESSES, SUCH AS DROUGHT (HECK ET AL, 1984 A & B). UNCERTAINTIES ABOUT OZONE IMPACTS ON FORESTS WIL BE IMPROVED AS DATA BECOMES AVAILABLE FROM RESEARCH RECENTLY PLANNED AND NOW GETTING UNDERWAY (NCASI, 1986).

IT SHOULD BE NOTED THAT ON MANY PLANT SPECIES THERE ARE NO VERY DISTINCTIVE SYMPTOMS DUE TO THE CHRONIC OZONE EXPOSURES-ONLY ACCELERATED LEAF AGING; CONSEQUENTLY FOR MOST OBSERVERS, THE IMPACT OF OZONE ON THE CROPS AND FORESTS IS OBSCURED BY THE ABSENCE OF ACUTE FOLIAR INJURY CAUSED BY HIGH CONCENTRATIONS OF OZONE. CONSEQUENTIALLY GOOD TECHNIQUES TO MEASURE YIELD LOSSES UNDER FIELD CONDITIONS ARE EXTREMELY IMPORTANT IN DETERMINING THE IMPACT OF ELEVATED OZONE CONCENTRATIONS. ACCELERATED AGING, AS PREMATURE LEAF LOSS, AND YIELD REDUCTIONS CAUSED BY ELEVATED OZONE CONCENTRATIONS MUST BE SEPARATED FROM THAT CAUSED BY OTHER PLANT STRESSES.

OZONE EFFECTS ON COTTON

COTTON IS RANKED AS THE FOURTH MOST VALUABLE CROP IN THE UNITED STATES WITH A FARM VALUE IN 1981 (USDA, 1982) OF ABOUT $4.1 BILLION FROM 13.8 MILLION ACRES. ABOUT 71 PERCENT OF THE COTTON ACREAGE IS IN THREE STATES: TEXAS, 52 PERCENT; CALIFORNIA, 11 PERCENT; AND MISSISSIPPI 8 PERCENT.

OZONE CAUSES ORANGE-RED AND SOMETIMES REDDISH BROWN SPOTS OR LESIONS ON COTTON LEAVES AND PREMATURE LEAF LOSS. THE HIGHEST MEASURED OZONE DOSE IN THE COTTON BELT IS IN THE SAN JOAQUIN VALLEY WHERE OZONE LEVELS AVERAGED 0.077 PPM FOR A DAILY 7-HOUR PERIOD FROM JULY TO MID-SEPTEMBER, 1981 AT AN EXPERIMENTAL SITE NEAR SHAFTER CALIFORNIA. EPA DATA INDICATE THAT PEAK HOURLY OZONE VALUES ALSO OCCUR DOWNWIND FROM MAJOR URBAN INDUSTRIAL CENTERS SUCH AS HOUSTON, TEXAS WHERE THE HOURLY MAXIMUM VALUE WAS 0.27 PPM. DURING PERIODS OF AIR STAGNATION, OZONE CONCENTRATIONS TEND TO BE SIMILAR IN RURAL AND URBAN-INDUSTRIAL AREAS. THERE IS A LACK, HOWEVER, OF ADEQUATE OZONE MONITORING IN THE AGRICULTURE PRODUCTION AREAS IN MOST IF NOT ALL STATES.

OZONE EFFECTS ON CITRUS

IN 1981, OVER 1.1 MILLION ACRES OF CITRUS WERE CULTIVATED IN THE UNITED STATES, PRIMARILY IN FLORIDA, SOUTH AND CENTRAL CALIFORNIA, AND THE SOUTHERN TIP OF TEXAS.

CITRUS GROWERS THROUGHOUT SOUTHERN CALIFORNIA NOTICED DECLINING YIELDS AND POOR TREE CONDITIONS AS EARLY AS THR MID-1940S. BY 1960, IT BECAME APPARENT THAT OZONE AND OTHER OXIDANT AIR POLLUTANTS WERE PROBABLY A MAJOR FACTOR IN THE DECLINE. ESTIMATED LOSSES IN THE THREE CALIFORNIA COUNTIES OF RIVERSIDE, SAN BERNADINO, AND VENTURA COUNTIES WERE ESTIMATED TO BE

ABOUT $20.79 MILION IN 1974 ALONE (IZAAK WALTON LEAGUE, 1982).

OZONE EFFECTS ON FORAGE

FORAGE, PRIMARILY ALFALFA, IS PRESENTLY (1981) GROWN ON 60.2 MILLION ACRES AND VALUED AT $9.2 BILLION. THE LARGEST FORAGE PRODUCING STATES ARE WISCONSIN, MINNESOTA, IOWA, CALIFORNIA, TEXAS, MISSOURI, KANSAS AND SOUTH DAKOTA.

TWO VARIETIES OF ALFALFA GROWN IN AMBIENT LEVELS OF OZONE AND OTHER PHOTOCHEMICAL OXIDANTS AT RIVERSIDE, CALIFORNIA HAD YIELDS REDUCED AS MUCH AS 42 PERCENT ALTHOUGH DAMAGE DEPENDED ON THE VARIETY TESTED AND THE STAGE OF PLANT DEVELOPMENT. FOUR OTHER FORAGE GRASSES TESTED UNDER SIMILAR CONDITIONS SHOWED A 10 TO 20 PERCENT REDUCTION IN YIELD, AND A REDUCTION IN TOTAL CARBOHYDRATE PRODUCTION - AN IMPORTANT CRITERIA FOR FORAGE. BECAUSE OF THEIR RELATIVELY LOW VALUE, FORAGE PLANTS HAVE NOT BEEN STUDIED AS THOROUGHLY AS OTHER FOOD OR FIBER CROPS. (IZAAK WALTON LEAGUE, 1982).

NCLAN RESEARCHERS HAVE CONDUCTED STUDIES ON FORAGE CROPS SINCE THE ABOVE INFORMATION WAS OBTAINED. HOWEVER, EVEN MORE LONG-TERM FIELD STUDIES WILL BE NEEDED TO CAREFULLY ASSESS THE EFFECTS OF OZONE ON THE DIVERSE SPECIES USED FOR FORAGE, INCLUDING MIXTURES OF SPECIES.

IT IS INTERESTING TO NOTE THAT ALFALFA IS ONE OF THE MOST SENSITIVE CROP PLANTS TO SULFUR DIOXIDE. LONG TERM FUMIGATIONS OF 0.05 PPM SULFUR DIOXIDE FOR 8 HOURS EACH DAY, UNDER CONTROLLED ENVIRONMENT CONDITIONS, CAUSED NO FOLIAR EFFECTS BUT REDUCED DRY WEIGHT OF FOLIAGE AND ROOTS BY 26 AND 49 PERCENT RESPECTIVELY. THIS COULD MEAN THAT GROWERS MAY EXPERIENCE SIGNIFICANT LOSSES ALTHOUGH THE PLANTS APPEAR NORMAL.

OZONE EFFECTS ON CORN

FIELD CORN RANKS FIRST IN THE UNITED STATES IN TERMS OF BOTH ACRES PLANTED (84 MILLION) AND IN DOLLAR VALUE ($20 MILLION). SEVENTY PERCENT OF THE CASH VALUE OF THIS CROP IS GENERATED IN IOWA, ILLINOIS, NEBRASKA, INDIANA, MINNESOTA, WISCONSIN, AND OHIO.

FIELD CORN IS RELATIVELY INSENSITIVE TO OZONE COMPARED WITH OTHER CROPS SUCH AS SOYBEANS, WHEAT, AND SPINACH. ALTHOUGH DAMAGE TO LEAVES MAY BE OBSERVED, THIS MAY OR MAY NOT RESULT IN REDUCTIONS IN YIELDS. SOME NCLAN RESEARCH INDICATES THAT SIGNIFICANT SEED YIELD REDUCTIONS OCCUR WHEN FIELD CORN IS EXPOSED TO A SEASONAL 7 HOUR AVERAGE OF 0.15 PPM OZONE. THIS MAY BE COMPARED TO THE PRESENT 7 HOUR PEAK OZONE AVERAGES THAT NOW RANGES BETWEEN 0.05 AND 0.07 PPM THROUGHOUT MOST OF THE CORN BELT. AT LOWER CONCENTRATIONS OF 0.06 PPM SEED YIELD REDUCTIONS WERE ESTIMATED TO BE ONLY 0.2 PERCENT.

IN CONTRAST WITH FIELD CORN, SWEET CORN APPEARS TO BE MUCH MORE SENSITIVE TO OZONE. IN 1974, THE SWEET CORN CROP LOSS IN SOUTHERN CALIFORNIA AFTER BEING SUBJECTED TO 0.11 PPM OZONE AVERAGE DURING DAYLIGHT HOURS WAS COMPUTED TO BE 39 PERCENT. AMBIENT OZONE CONCENTRATIONS IN MARYLAND, WHERE THE 7-HOUR OZONE CONCENTRATIONS AVERAGE ABOUT 0.06 PPM, CAUSED SIGNIFICANT YIELD LOSSES (9.2%) ON SWEET CORN BASED ON TWO YEARS OF EXPERIMENTS CONDUCTED WITH FOUR VARIETIES GROWN IN OPEN-TOP FIELD CHAMBERS WITH CHARCOAL-FILTERED AND NONFILTERED AIR.

OZONE EFFECTS ON SOYBEANS

SOYBEANS HAVE BECOME AN INCREASINGLY IMPORTANT FARM COMMODITY IN RECENT YEARS. IN 1981 SOYBEANS RANKED SECOND ONLY TO CORN IN ACREAGE HARVESTED (68 MILLION) AND DOLLAR VALUE ($13 BILLION). SOYBEANS ACCOUNT FOR 19 PERCENT OF THE CASH VALUE OF MAJOR U.S. CROPS. THEY ARE GROWN PRIMARILY IN THE CORN BELT WITH ILLINOIS, IOWA, MISSOURI, MINNESOTA, INDIANA AND OHIO BEING THE TOP PRODUCING STATES.

SOYBEANS ARE RELATIVELY SENSITIVE TO OZONE AND VISIBLE INJURY TO THE LEAVES IS OFTEN OBSERVED IN THE FIELD AFTER A PERIOD OF HIGH OZONE CONCENTRATIONS. IN 1977, ONE RESEARCHER (KOHUT) FOUND SOYBEANS IN MINNESOTA GROWN IN OPEN-TOP FIELD CHAMBERS WITH FILTERED AIR YIELDED 24 PERCENT MORE THAN THOSE EXPOSED TO AMBIENT POLLUTANTS, PRIMARILY OZONE. IN A SIMILAR STUDY IN MARYLAND, YIELD REDUCTIONS OF 20 PERCENT WERE FOUND. MORE RECENT NCLAN STUDIES AT FOUR SITES SHOWED REDUCTIONS FROM 11 TO 25 PERCENT DEPENDING UPON THE LOCATION AND VARIETY GROWN. ALL WERE VATIETIES MOST COMMONLY GROWN AT EACH LOCATION. STUDIES SHOW THAT RELATIVELY SLIGHT CHANGES IN OZONE CONCENTRATIONS RESULT IN SIGNIFICANT CHANGES IN SOYBEAN YIELDS. FOR EXAMPLE, A CHANGE OF OZONE CONCENTRATION OF AS LITTLE AS 0.01 PPM IN THE 7 HOUR MEAN COULD ALTER YIELDS BY 3 TO 6 PERCENT. CURRENT OZONE LEVELS VARY FROM ABOUT 0.04 TO 0.07 PPM FOR A 7 HOUR MEAN OVER THE RANGE SOYBEANS ARE GROWN.

DROUGHT CONDITIONS USUALLY REDUCE THE IMPACT OF OZONE ON PLANTS; HOWEVER, A RECENT STUDY IN MARYLAND (HEGGESTAD ET AL, 1985) SHOWED THAT THE THE COMBINED EFFECTS OF DROUGHT AND AMBIENT OZONE ON SOYBEAN YIELDS WERE ABOUT FIVE TIMES GREATER THAN THE EFFECTS OF EITHER STRESS ALONE.

MORE RESEARCH IS NEEDED TO UNDERSTAND THE EFFECTS OF DROUGHT AND OZONE WHEN PLANTS ARE GROWN ON VARIOUS SOIL TYPES AND WITH VARYING DEGREES OF THESE COMMON PLANT STRESSES ON SOYBEANS; BUT, ALSO, ON OTHER SPECIES.

OZONE EFFECTS ON WHEAT

IN 1981 MORE THAN 81 MILLION ACRES OF WHEAT WERE CULTIVATED WHICH YIELDED GRAIN WORTH ABOUT $10.2 BILLION. THE MAJORITY OF WHEAT IS PRODUCED IN THE STATES OF KANSAS, NORTH DAKOTA, TEXAS, MONTANA, OKLAHOMA, WASHINGTON, AND MINNESOTA. OTHER ECONOMICALLY IMPORTANT GRAIN CROPS INCLUDE SORGHUM, OATS, BARLEY, AND RYE.

THERE HAS BEEN RELATIVELY LITTLE RESEARCH TO QUANTIFY THE IMPACT OF OZONE ON WHEAT AND PRODUCTION OF OTHER GRAINS. AN EXPERIMENT IN NORTH CAROLINA IN 1979 REVEALED THAT EXPOSURE TO AMBIENT LEVELS OF OZONE (0.06 PPM) REDUCED YIELD BY 4 PERCENT. AN NCLAN STUDY INVOLVING FOUR VARIETIES SHOWED A YIELD REDUCTION DUE TO ELEVATED OZONE IN AMBIENT AIR RANGING FROM 4.5 TO 5.9 PERCENT, DEPENDING ON VATIETY.

OZONE EFFECTS ON SOME OTHER CROPS

IN EASTERN UNITED STATES THERE ARE DOCUMENTED YIELD LOSSES FROM FIELD EXPERIMENTS, MOSTLY IN MARYLAND, COMPARING YIELDS IN OPEN-TOP CHAMBERS WITH AMBIENT AIR (PRIMARILIY OZONE) AND IN CHARCOAL FILTERED AIR ON POTATOES, SNAP BEANS, LIMA BEANS, TOBACCO, AND SPINACH. LOSSES WERE ABOUT THE SAME MAGNITUDE AS FOR SOYBEANS, DEPENDING UPON VARIETY GROWN. WITH THESE SPECIES THERE SEEMS TO BE A GREATER RANGE IN VARIETY SENSITIVITY AND TOLERANCE TO OZONE THAN SHOWN BY SOYBEAN VARIETIES.

CONCLUSIONS AND RECOMMENDATIONS

WE KNOW THAT PRESENT LEVELS OF OZONE NOW IN OUR AIR CAN CAUSE ECONOMICALLY SIGNIFICANT REDUCTIONS IN MANY OF OUR CROP COMMODITIES WITH SOYBEANS LOSSES BEING GREATER THAN FOR OTHER MAJOR CROPS. WE ALSO KNOW THAT REDUCING THE OZONE LEVELS THROUGH CONTROL MEASURES WHICH REDUCE OZONE PRECURSORS (REACTIVE HYDROCARBONS AND NITROGEN DIOXIDE) WOULD LEAD OVER TIME TO SIGNIFICANT REDUCTIONS IN OZONE LEVELS THROUGHOUT THE COUNTRY AND PARTICULARILY IN AREAS NOW ACUTELY AFFECTED BY THE PROBLEM. I RECOMMEND THAT RESEARCH BE CONTINUED TO REMOVE THE MANY UNCERTAINTIES ABOUT THE IMPACT OF OZONE ON CROPS AND FOREST SPECIES. BUT EVEN NOW THE EVIDENCE IS SUFFICIENT TO SHOW IMPORTANT BENIFITS FROM ACTION TO CURB OZONE AIR POLLUTION.

THANK YOU

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THE NEW CLEAN AIR ACT

THURSDAY, OCTOBER 2, 1986

U.S. Senate,
Committee on Environment and Public Works,
Washington, DC.

The committee met, pursuant to notice, at 9:56 a.m., in room 406, Dirksen Senate Office Building, Hon. Robert T. Stafford (chairman of the committee) presiding.

Present: Senators Stafford, Chafee, Simpson, Domenici, Durenberger, Burdick, Baucus, and Lautenberg.

OPENING STATEMENT OF HON. ROBERT T. STAFFORD, U.S. SENATOR FROM THE STATE OF VERMONT

Senator **Stafford**. The committee will come to order. The committee meets today to consider four topics. The first is the nomination of Dr. Vaun A. Newill, to be EPA Assistant Administrator for Research and Development. We then will consider three small bills, though I wouldn't describe them as small in talking with their sponsors. But one is H.R. 2403, to encourage GSA compliance with local building codes. Another is S. 511, naming the Arthur R. Marshall Loxahatachee National Wildlife Refuge in Florida. Another is S. 2890, naming the Albert V. Bryan Federal Courthouse in Alexandria, VA.

We propose, as members arrive, to conduct a rolling rollcall as to those three items of business. I am delighted that Senator Domenici is able to join me this morning. I am sure others will a little later. We will also be putting the nomination of Dr. Newill up on rolling rollcall as well.

I am going to read my opening statement in the interest of time, but we will not start with witnesses until the hour appointed for the hearing, which will be the committee's fifth and final hearing during this Congress on the subject of legislative proposals to control air pollution.

This has been a valuable set of hearings. The issues have been sharpened, and the fundamental differences have been identified. We are not well situated, after the conclusion of today's session, to proceed directly to markup. Under the current schedule, it is likely that markup will not occur, however, until January, unless we find ourselves in a protracted lameduck session.

Under the current schedule, I would hope that the markup vehicle would be S. 2203, which has been cosponsored by a majority of the committee's members. But it is clear that we must make some changes in the bill, although its basic structure, I believe, is sound.

It has become increasingly clear that polluters have more to gain from continuing to pollute than from stopping. They save money and buy time. Air pollution's injuries are numerous, but subtle, so lawsuits for damages are seldom brought and even less frequently won. Frankly, I am at a loss to know how this might be changed. But I think it is an area where some improvement is needed, either as part of this legislation or as a separate proposal.

If any of this morning's witnesses have any ideas on this subject, I would appreciate hearing from them.

At this point, Senator Domenici, if you have any opening statement, I would welcome it. Otherwise, I will keep the hearing record open at this point for any members' opening statements in case they have them.

Senator **Domenici**. Mr. Chairman, I have no opening statement. I thank you for your courtesy.

Senator **Stafford**. Thank you, Senator.

We will wait 1 minute and 30 seconds and then we will start the hearing.

[Pause.]

Senator **Stafford**. The hour of 10:01 having arrived, we are going to begin the hearing with respect to the three panels which will appear in front of the committee this morning. Before the panels do come to us, Dr. James Galloway, Department of Environmental Sciences, University of Virginia, will be the first witness.

Doctor, I would invite you to take the witness table, and we welcome you to this hearing. We appreciate your being here. We would welcome your comments this morning. If you have a prepared statement—and I see you do—we would ask you to summarize it if you can, and we will place the entire statement and the attachments to it in the record.

STATEMENT OF DR. JAMES N. GALLOWAY, DEPARTMENT OF ENVIRONMENTAL SCIENCES, UNIVERSITY OF VIRGINIA

Dr. **Galloway**. Thank you, Mr. Chairman. Being a professor from the University of Virginia, I'll use my loudest voice to get my points across.

I have been an environmental scientist since 1968 and have been involved in studying the acid deposition issue since 1974. Throughout the course of this investigation, the questions that I always get asked about acid deposition are as follows: "Does it exist? Is it caused by human activity? Where does it exist? How bad is it? Does it affect the environment? How does it affect the environment?"

Now, when a policymaker asks me that question, they like to have absolute answers like yes and no. As a scientist, I can't give absolute answers. I give answers like, "I don't know. On the one hand—on the other hand."

This gives the impression of uncertainty about the issue of acid deposition. The point of my testimony today is to say that although there is uncertainty about many aspects of acid deposition, the uncertainty is small relative to the extent and wealth of our knowledge.

I would like to define two types of uncertainty: absolute and relative. Absolute uncertainty about environment issues assumes we know nothing at all: we don't have a theory, we don't have data to detect a change in the environment. That is not the case with acid deposition. Acid deposition is more of a case of relative uncertainty. We understand from a theoretical basis, from basic principles, how the environment responds to acid deposition.

Scientific uncertainty occurs because there are always additional questions to be asked, but in the acid deposition issue these are questions that are on the order of dotting i's and crossing t's.

I would like to give you some examples of our knowledge on acid deposition. I first testified before a congressional committee in 1976. Colleagues of mine have testified before congressional committees on the acid deposition issue prior to 1976. In preparation for this testimony I have gone back to the files and examined past testimony. I find that the questions haven't changed, but I also find the answers haven't changed. The answers that the scientific community has provided the U.S. Congress are the same.

The only thing different is that the answers have gotten more concrete. Instead of just talking about acid rain, now we realize there is dry deposition; there are acid clouds. We realize that ozone is affecting forests. So, again, the uncertainty is not absolute. We know these things are occurring, and as time goes by we are finding out more and more just how much they are occurring.

But, can we say that there is scientific consensus on this issue? Well, I obviously wouldn't have posed that question unless I was prepared to say, "Yes, there is." Over the past 5 years there have been several reviews published on acid deposition, reports issued by the U.S. EPA, by the National Academy of Sciences—the most respected scientific body in this country—by the White House OSTP, and by the congressional OTA. All reports have used different information to ask similar questions, the general kinds of questions I posed earlier.

A group of us formed an ad hoc committee to pose a series of questions on the acid rain issue and then determine how these reports answered the questions.

It is important to stress that this ad hoc scientific group did not answer the questions, all it did was excerpt segments of these six different Government documents published on the acid rain issue.

The similarity of the answers in the different reports is surprising. It is especially surprising that the answers to the questions like is there acid deposition, does it affect streams, does it affect forests are the same whether they come from the EPA, the National Academy of Sciences, the White House OSTP, or the OTA. Based on these similarities, we believe that there is scientific consensus on the issues of acid deposition.

Now, for the benefit of the committee, I have appended a copy of the report of the ad hoc committee to my testimony. But, again, let me stress, the committee did not write this report. The six scientific reports on acid deposition wrote the report. All the committee did was to look to see how each report answered the identical questions.

We are still making advances in the acid deposition issue, but again, these are advances that are not coming up with new theories, but rather, testing existing theories that are accepted, proving these theories, or, as I said, dotting the i's and crossing the t's. I would like to give you two examples of this.

Since we began research on acid deposition and the effects on surface waters in eastern North America back in the 1970's, we realized that there must be a fundamental difference between sensitive streams and lakes in the Northeastern United States and the sensitive streams and lakes in the Southeastern United States; both areas received identical amounts of acid deposition. Both areas had streams and lakes of identical sensitivity. But in the Northeastern United States, the streams and lakes were experiencing regional scale acidification. In the Southeastern United States they weren't. So, there's a fundamental difference in something in the ecosystem.

As time went on, we realized that the fundamental difference is in soils. I there are basic differences in the soils of the Southeastern United States compared to the Northeastern United States. This difference in the soils is now preventing large-scale acidification of streams in the Southeastern United States, but this prevention is only temporary. Eventually sensitive surface waters in the Southeastern United States will experience the same degree of regional acidification as the Northeastern United States.

This is a critical scientific advancement, but it's not an advancement today. We knew this some time ago. What I would like to share with you today is actual data showing that we are now documenting acidification of surface waters in the Southeastern United States.

There are two types of data. One is a long-term record from the U.S. Geological Survey benchmark stream stations. These data show that these streams are increasing their sulfate concentrations and decreasing their pH. But this time record on the streams is spotty. The samples are taken only once a month, and sometimes months are missed.

The second database I would like to talk about today is a 6-year record of weekly stream samples from Shenandoah National Park. One stream, Deep Run in the southwestern section of Shenandoah National Park, has decreased its pH over the 6 years from 5.8 to 5.4, due to increases in sulfate concentration. The sulfate is from a reservoir of old atmospheric sulfur deposited in this watershed in the past few decades that is now leaking into these streams and causing acidification.

Now, this pH reduction seems small, 5.8 to 5.4, but it's enough to cause one fish population to theoretically disappear and another fish population to theoretically stop reproducing.

The point is that the acid depositor issue has received a lot of attention because of regional-scale acidification in the Northeastern United States, but what I am telling you today is that that is only half the problem relative to surface water acidification. The other half that is going to be facing us in the next two to three decades is that sensitive streams in the Southeastern United States will increase the rate of acidification, with concurrent losses in biological populations.

An additional matter that I would like to discuss is that I have been using the words "acid deposition" the entire testimony. That is a shorthand for acid deposition and other pollutants. It used to be that we were primarily concerned with acid deposition. However, we realized that the trees, and lakes and streams don't just experience acid deposition, they also experience ozone and other air pollutants. So, I applaud the committee's attempt to include acid deposition and air pollutants in this bill that is being considering.

In summary, I would like to make two points: There is scientific consensus on the issue of acid deposition. The questions we are asking today are small questions relative to the body of evidence in front of us that acid deposition exists, it acidifies surface waters, it effects soils, it effects aquatic systems and, in concert with other pollutants, it affects forest ecosystems.

Second, again, I stress, we can't just deal with acid deposition. We have to have a holistic view of what these sensitive ecosystems receive from the atmosphere.

Thank you very much.

Senator STAFFORD. Thank you very much, Dr. Galloway.

I wonder if you would be willing to describe your own background in environmental science a little for the committee.

Dr. GALLOWAY. I would be glad to. I received a Ph.D. in chemistry from the University of California at San Diego in 1972. I was a postdoctoral associate with Gene Likens at Cornell University. Some might call him the father of acid rain. He would probably hit me if he were here. I worked with him until 1976.

Senator STAFFORD. Was that at Cornell?

Dr. GALLOWAY. At Cornell.

Senator STAFFORD. You may have run into a son-in-law of mine who is on the faculty in the biology department, named Dr. John Glaze. My daughter is also on the faculty there.

Dr. GALLOWAY. Well, back in 1976 I was a postdoc. Postdocs didn't associate with faculty you know. We were relegated to the basement.

In 1976 I went to the University of Virginia. I have worked on the acid deposition issue specifically since 1974 and have a variety of research projects on the issue.

Senator BURDICK. Mr. Chairman.

Senator STAFFORD. Yes.

Senator BURDICK. He has a very impressive biography, but you didn't say University of Minnesota.

Dr. GALLOWAY. That is a junior college, isn't it?

Senator STAFFORD. He didn't play football.

Doctor, before we get to questions, if I could interrupt just for a minute.

[Recess.]

Senator STAFFORD. Now we will turn to Dr. Galloway again.

Pardon our little interruption to get this other matter expedited.

Incidentally, are there any opening statements that the members wanted to make at this point?

[No response.]

Senator STAFFORD. If not, Doctor, many of the witnesses have said there is no acid rain problem in the United States. How would you characterize the level of scientific consensus and evidence on the question of whether or not there is an acid rain problem in this country? Is the evidence slight or modest or somewhat greater than that?

Dr. **Galloway**. The evidence that acid deposition exists in this country is overwhelming. There is no question about that. Anybody who says that it is not in this country is wrong, scientifically incorrect. The evidence that acidification of surface waters due to acid deposition occurs is overwhelming. Anybody who says that it does not occur is incorrect. Other evidence that acid rain and other pollutants can affect forests and ecosystems is overwhelming.

Senator **Stafford**. Thank you. One of the criticisms of S. 2203—that is the bill that a majority of the committee have cosponsored with me—is that it goes beyond sulfur dioxide and deals with other pollutants, such as oxides of nitrogen and ozone.

Based on what you know about the probable causes of various kinds of environmental damage, do you believe this criticism is justified? Should legislation deal only with sulfur dioxide and ignore ozone and oxides of nitrogen?

Dr. **Galloway**. I believe that legislation that ignored ozone and oxides of nitrogen, would have a fundamental error in its approach.

Senator **Stafford**. I take it that your work in the Shenandoah leads you to believe that not only is there now evidence of acid rain damage in the Southeast, but that if there are no pollution reductions, that damage will worsen? Is that correct?

Dr. **Galloway**. Yes; that is quite clear. In other words, the Southeastern United States in the next couple of decades could become the same kind of situation we have in the Northeastern United States relative to surface water acidification.

Senator **Stafford**. Thank you very much, Dr. Galloway. I really appreciate your being here.

Senator Burdick, do you have questions of Dr. Galloway?

Senator **Burdick**. I regret that I didn't hear your statement, but I am going to read it very carefully. In view of what the chairman has said, can we handle all of this at one time and do a good job?

Dr. **Galloway**. Pardon me, Senator?

Senator **Burdick**. Can we handle all these pollutants at one time and still do a good job?

Dr. **Galloway**. When you say "handle these pollutants"——

Senator **Burdick**. Well, I mean, sulfur and ozone and all the rest of them in one package.

Dr. **Galloway**. I believe we need to. I am sure we can do this. I am sure the technology exists.

Senator **Burdick**. In other words, the problem is so great, as you described it, that it is almost overwhelming. You would not advise zeroing in on one particular area?

Dr. **Galloway**. No, I would not. I think a broad approach is necessary.

Senator **Burdick**. OK. Thank you, Mr. Chairman.

Senator **Stafford**. Senator Chafee.

Senator **Chafee**. Thank you, Mr. Chairman.

I am also sorry that I missed the bulk of Dr. Galloway's testimony.

In your testimony, you don't get into where the sulfur comes from, do you? You just say it's there.

Dr. **Galloway**. The sulfur that we receive in atmospheric deposition in the Eastern United States comes primarily from coal combustion.

Senator **Chafee**. From coal combustion?

Dr. **Galloway**. Coal combustion.

Senator **Chafee**. One of the problems we have been wrestling with here is automobile emissions, truck emissions, and, of course, the utility plants' emissions. It has seemed to me, as we have listened to this testimony, that it corroborates what you have said. Most of it comes from coal emissions, although automobiles are a part of it, a small part.

But in your testimony, do you touch on that, that it comes from the coal?

Dr. **Galloway**. No, I don't. My testimony focused on the broader issues of scientific consensus on the acid deposition issue and the relationship of acid deposition and other air pollutants.

Senator **Chafee**. So, when you give the answer that the greatest bulk of sulfur depositions come from the burning of coal, do you have a paper on that or have you testified to that in the past?

Dr. **Galloway**. I remarked earlier that I testified in 1976 before a congressional committee. At that time we were still making the point that most of the acid deposition—most of the sulfur in acid deposition—came from coal combustion. The evidence that coal is the primary source for sulfur in the atmosphere in the Eastern United States is overwhelming. I would be happy to provide you with stacks of different papers concerning this issue.

Senator **Chafee**. No, we don't need stacks. Maybe just a compilation of references to what you think is the most substantial authority on this.

Dr. **Galloway**. I would be glad to provide that to the committee. I might also point out that in the document that is appended to my testimony, six documents are referred to that address the issue of where does the sulfur come from. So, you could get any one of those six documents and you would have your small stack.

Senator **Chafee**. These are the six documents that you refer to on page 3 of your testimony?

Dr. **Galloway**. That's correct.

Senator **Chafee**. Well, if those are the ones, then there is no need for you to send in some something else.

Now, pursuing it a bit more, you talked about the lakes and streams in the Shenandoah Valley being affected by acid rain, and then you said the bulk of that comes from sulfur emissions; what else contributes to it?

Dr. **Galloway**. Let me correct a couple of things, a couple of points. First of all, it's not Shenandoah Valley, it's Shenandoah National Park. There are no lakes in Shenandoah National Park. In fact there are only two natural lakes in the State of Virginia. We're dealing here with an issue of stream acidification in the mountainous regions of the Southeastern United States.

Second, the sulfur coming out of the atmosphere in Virginia and in the rest of the Southeastern United States is from fossil fuel combustion, primarily coal combustion. If you took away the coal sulfur out of atmospheric deposition, you would remove about 95 percent of the sulfur in atmospheric deposition.

Senator **Chafee**. All right, let's pursue that some more. So, if you removed 95 percent of the sulfur in the acid depositions—is that correct?

Dr. GALLOWAY. Yes.

Senator CHAFEE. OK. Then you're remaining with the auto emissions?

Dr. GALLOWAY. No; the remaining would be natural emissions of sulfur sources. The automobile does not produce very much sulfur at all compared to coal. The automobile produces a tremendous amount of nitrogen oxides, but not sulfur.

Senator CHAFEE. And how much of a contributor are the nitrogen oxides?

Dr. GALLOWAY. To the acidity of atmospheric deposition?

Senator CHAFEE. Right.

Dr. GALLOWAY. About one-third. And two-thirds is from sulfuric acid.

Senator CHAFEE. The reason I pursue this is that obviously we are trying to get a handle on what to do, and the coal people are going to testify after you, and I suspect they won't be enthusiastic about doing anything about the coal. We have had testimony about what has happened to the Black Forest in Germany, by previous witnesses. There, they seemed to attribute it both to the sulfur and to the nitrogen oxides from the automobile. There, they seemed to attribute a lot more to automobiles than we do here.

Why should that be so? Why should automobile emissions be more significant in Germany than they are here?

Dr. GALLOWAY. Well, the atmospheric concentrations are higher in Germany, for one thing. The atmospheric concentrations of sulfur and nitrogen oxides are higher in Germany than here.

Second, there is no doubt that the concentrations of nitrogen oxides—and ozone, I might add—affect environmental systems.

Senator CHAFEE. Fine.

Thank you very much.

Senator STAFFORD. Thank you, Senator Chafee.

Senator DURENBERGER. Thank you very much, Mr. Chairman.

The forests in the Alps are dying, in large part, because of NO_x, that, and a large part comes from the fact that there is an incredible number of cars, on weekends in particular, moving through some of those mountain passes. And there are no speed limits. I cannot explain—maybe you can—technologically why the difference between 55 miles an hour and 110 miles an hour produces a whole heck of a lot more pollution. That, combined with the fact that the lead content in gasoline and some other factors in Europe is different.

This country has taken some very good anti-air-pollution steps which have benefited us in our fight against acid rain over the last 12, 15 years in our approach toward the conservation of gasoline and now the elimination of lead content and things like that.

So, would you not agree that that is one of the reasons why you see some of the distinctions in the United States in terms of causation?

Dr. GALLOWAY. Yes; no question about that. We have controlled emissions of several things to the atmosphere in addition to lead and nitrogen oxides. In the absence of any controls, the picture is very bleak. I spent 1 month in China last year, exploring the work on acid deposition that the People's Republic of China is doing and visiting some areas. That is a country with essentially very little control of anything. The air quality there is horrendous, just horrendous.

Coming back here, it was as if we did not have a problem. But we do. We haven't controlled enough, and in our controls we have to learn from past mistakes. If you control just one thing, that is, sulfur, then you're going to be missing part of the effects. You have to be controlling the things that the ecosystem sees. So, it is not only sulfur, it is nitrogen oxides and ozone.

Senator Durenberger. Next, it's also possible that a relaxation of air standards in certain, say, metropolitan areas, even in the West, could present the West with problems, that in a macro sense the West might not have like the East or the Northeast has. But in the specific sense, when we are asked the question, "Is acid rain a problem," and some of us say, "Yes, acid rain is a problem," doesn't mean that the whole Nation is becoming acidified, but it means that in certain areas, through certain specific causes, there are problems that need to be addressed.

Would that be one way to characterize the response to, "Is there an acid rain problem?"

Dr. Galloway. If you want to make a regional approach, I would say that the acid rain problem in the East is documented; the effects are seen; there is a wide variety of scientific literature on it, as the report appended to my testimony points out. The acid deposition situation in the West exists in the following ways: There are regions of the West that have quite acidic acid deposition; there are regions in the West that have very high concentrations of NO_x and ozone. The atmospheric dynamics in the West allow for much greater dispersion of these pollutants. So, you have more rapid transport around the West.

From the ecosystem standpoint, the mountainous ecosystems there, are, if anything, more sensitive than the ones in the Eastern United States. So, I would characterize the Western United States as not only having a problem, but having the potential for a much bigger problem in the future.

Senator Durenberger. I regret not having heard your opening statement, but have you had conversations with the forest products industry in the United States relative to their concern or lack of concern for the problem of acid rain?

Dr. Galloway. No, I have not.

Senator Durenberger. So, your field of expertise is principally in the acidification of lakes and streams?

Dr. Galloway. I am a chemist, and I found pure chemistry very dull. Also, organic chemists only live to be 55 years old on the average, and so I thought I would get out in the fresh air.

I try to understand how the environment works from a basic viewpoint. I study chemical cycling all over the environment, not only lakes and streams; I operate a program that samples rain in very remote parts of the world to identify what the background composition of rain is. And I look at the transport of air pollutants from North America to Europe across the Atlantic Ocean. So, I have a relatively broad brush in my approach to the acid deposition issue.

Senator Durenberger. Have you reached any conclusions relative to whether prevention or cure would be the most appropriate course for the United States of America? In other words, we could make an investment in eliminating or reducing emissions or we could put our investment into liming lakes and doing other things to offset specific impacts. Have you reached some conclusions as to the preferable way we ought to go?

Dr. GALLOWAY. I reached a conclusion about liming a long time ago. On liming—I make the analogy that when you lime the lake, it's as if you have a cut on your thumb and to stop your thumb from bleeding you cut off your hand. We are adding something to an ecosystem, we are adding another perturbation to the ecosystem, to solve the original perturbation, that is, acid rain.

Second, there is just basic, plain economic sense about liming. It is expensive. You can't lime all the lakes and streams that are susceptible to acid deposition. And you certainly can't lime forests on a regional basis.

Senator STAFFORD. If the Senator would yield, I always wonder on the liming of lakes, how you might lime Lake Erie or Lake Champlain, which is 115 miles long and 15 miles wide. It would certainly take an awful lot of lime.

Dr. GALLOWAY. It would.

Senator DURENBERGER. The problem of how do the Canadians—and if we're going to insist on acidifying Canadian lakes, they aren't left with a lot of choices. The lakes we had the chance to look at in Sweden were being destroyed by the Brits, and obviously the Brits don't admit to that sort of thing, but it doesn't take a lot of smarts to figure that one out.

So, I think that is why addressing the question of is it a problem is almost more important today than what are we going to do about it. But I appreciate very much your comments on the solutions to the problem.

Thank you, Mr. Chairman.

Senator STAFFORD. Thank you very much, Senator Durenberger. Senator Burdick.

Senator BURDICK. I was interested in your reply to the Senator's question, when you replied about pollution across the ocean. There is no problem, then, with pollution crossing the border between Canada and the United States, is there?

Dr. GALLOWAY. There is a fundamental problem. My wife is Canadian, so what can I say?

In 1978 I published a paper with a Canadian scientist, Doug Whelpdale, where we calculated the flux of sulfur from the United States to Canada and Canada to the United States. Based on those numbers, which have stood the test of time very well the United States puts as much sulfur into the Canadians' atmosphere as they put in their own atmosphere. So, there is very definitely a phenomenon problem, if you will, of transboundary transport.

Senator BURDICK. Well, just a minute. You're going right in the face of facts. Don't you realize there is not one scrubber in Canada in any of their powerplants?

Dr. GALLOWAY. There is also not very many people.

Senator BURDICK. Not one.

Dr. GALLOWAY. Yes, sir, but there is also a population that is much lower than in the United States. If you look at the numbers, the actual numbers of emissions, the United States—these are using 1980 numbers—put 14 million metric tons of sulfur into the atmosphere. The Canadians put 2.1 million.

Senator **Burdick**. Well, you're probably talking about a different border. I am talking about where the Central and Western part of the United States borders. I don't have to use any fancy machinery or any gauges or anything else, just use my eyes. There is a powerplant up there half a mile from the Canadian-North Dakota border, you can see it. You don't have to measure it.

Dr. **Galloway**. We are using different borders. My border is the eastern North American border, from the Great Lakes eastward.

Senator **Burdick**. As a matter of fact, prevailing winds are from the north to northwest. That is a known fact. That stuff can't go against the wind. So, it all comes down into the United States.

Dr. **Galloway**. The sulfur from the United States to Canada, the net transport is north—is south to north. Now, this is in eastern North America now; I am not talking about western Canada and Western United States. I am talking about east of the Mississippi, east of the Great Lakes.

Senator **Burdick**. That is out of my territory. But I know in the West and Middle West it is just the other way around.

Well, having said that, I yield.

Senator **Stafford**. All right, Doctor, we thank you very much for coming here. We appreciate it.

We will now hear three panels. The first panel will consist of: Mr. Harry L. Storey, who is the president of Alliance for Clean Energy, from Denver, CO; Mr. Richard L. Kerch, manager, air quality activities, Consolidated Coal Co., from Washington, DC; Mr. Charles Henderson, president of the Clean Coal Coalition, Inc., of Washington, DC; and Mr. James C. Wilson, president, Rocky Mountain Energy, from Bloomfield, CO.

Gentlemen, I apologize for the fact that we have severe time constraints. Where you have written testimony, we will place the testimony in each case in the record and invite you to summarize it, if you would. We will go in the order in which I called your names.

Mr. Storey, you will be first, followed by Mr. Kerch.

STATEMENT OF HARRY L. STOREY, PRESIDENT, ALLIANCE FOR CLEAN ENERGY

Mr. **Storey**. Thank you, Mr. Chairman. My name is Harry Storey, and I am president of the Alliance for Clean Energy, or ACE. ACE represents over 30 producers, carriers, and consumers of low-sulfur coal. Our member companies have operations in every major coal mining State in both the Eastern and Western parts of the United States.

I appreciate the opportunity to testify here today on S. 2203. As many of you know, ACE has not, and currently does not, support any acid rain control legislation. We believe that there is still considerable scientific uncertainty about the cause and effects of acid rain. Having acknowledged that uncertainty, ACE nevertheless accepts that enactment of some type of acid rain legislation is inevitable.

Acid rain legislation appears inevitable for several reasons. First, public opinion appears to support by an overwhelming majority of

79 percent, according to a recent Harris poll. Approximately 45 Governors are on record supporting acid rain controls.

Third, the United States and Canadian Special Envoy on acid rain concluded in their December 1985 report that acid rain is a serious environmental problem and that further SO_2 reductions are needed.

Further, we know that scientific uncertainty is inherent in most environmental issues, and we understand that Congress sometimes takes action in the face of what is concededly less than perfect scientific information.

If, in fact, acid rain legislation is inevitable and imposes new SO_2 reduction requirements on coal-burning utilities, ACE has urged that such legislation should be based on three policy and key principles:

First, acid rain legislation should be cost effective. To be cost effective, it must permit the use of the most cost-effective compliance methods and a full range of compliance options. In simple terms, Mr. Chairman, it should allow freedom of choice;

Second, the cost of meeting new SO_2 reductions should be borne by those who are causing the excess emissions. This simple statement reaffirms the "polluter pays" principle;

Finally, acid rain legislation should be flexible enough to allow changes in emission reduction targets as more and more is learned about the cause and effects of the acid rain phenomenon.

We think each of the principles are important. Together, they will maximize the effectiveness of any new acid rain control program and certainly will minimize the cost.

Mr. Chairman, there is only one bill now before the Senate that meets all three of these criteria. That bill is S. 2813, introduced on September 12, 1986, by Senators Proxmire, Humphrey, and others. In our view, it represents a cost-effective and freedom-of-choice bill for the reduction of SO_2.

In singling out S. 2813, I do not want to ignore other Senate bills that substantially meet these three important criteria. In fact, Senator Mitchell's original acid rain bill, reintroduced as S. 2200 in this Congress, as well as bills reported out of this committee in each of the last two Congresses, were also good examples of "freedom of choice," "polluter pays" legislation.

Mr. Chairman, ACE and its members have devoted a great deal of time and effort trying to develop a consensus among supporters of acid rain legislation, consensus that any acid rain legislation should embody these principles. We believe that many, if not most, members of the business community share our views on these principles.

This brings me to S. 2203. Mr. Chairman, we were surprised and disappointed when this bill was introduced last April. We were surprised because it represented a total retreat from the cost-effective approach the committee has followed for the past two Congresses. I must tell you that while ACE has not decided to support bills like S. 2813, I can assure you that our organization must oppose S. 2203 because it violates the principles I have mentioned a moment ago. It is not cost effective. It is not a freedom-of-choice bill.

S. 2203, quite simply, is a forced-scrubbing bill. There is only one way to meet the SO_2 emission requirements in this bill, and that is with flue gas desulfurization unit scrubbers. S. 2203 effectively outlaws any other compliance strategy. S. 2203 will impose two requirements on coal-fired powerplants built before 1971. The practical effect of those requirements is to force utilities to use scrubbers to reduce SO_2 emissions.

The first requirement in S. 2203 says that as soon as a powerplant turns 35 years old, it must meet the same SO_2 requirements as new powerplants do. This includes the infamous percent-reduction requirement. The percent-reduction requirement was added to the Clean Air Act in 1977. It says that new powerplants must reduce SO_2 emissions between 70 and 90 percent no matter how little sulfur is in the coal they burn and no matter how little SO_2 powerplants might emit.

The percent-reduction requirement has nothing to do with air quality. It was added to the Clean Air Act in 1977 to prevent new powerplants from using clean, low-sulfur coal to reduce SO_2 emissions. The percent-reduction requirement was designed and intended to protect and expand markets for high-sulfur coal. S. 2203 will now extend this market protection regulation to old powerplants as well as new ones. This time, in the name of acid rain.

There is a second SO_2 reduction requirement in S. 2203 that also kicks in, and becomes effective in 1991. It says that all coal-fired powerplants that are not yet 35 years old, must meet an emissions limit of 0.7 pound SO_2 per million Btu's. This interim requirement will apply to old powerplants until they turn 35.

It is claimed that the 0.7-pound-of-SO_2 standard will benefit the low-sulfur coal industry because, it will allow some utilities to switch to low-sulfur coal for a few years until fuel switching is outlawed, by the percent-reduction requirement. Mr. Chairman, this claim is, at best, a very cynical one. If the bill means what it says—that no plant can ever exceed an emission limit of 0.7 pound of SO_2 per million Btu's--then I can assure you there is very little economically mineable coal anywhere in the United States that consistently meets this standard.

ACE members are experts on the subject of low-sulfur coal. In the entire United States, we are aware of only four mines that consistently produced coal in 1985 that could meet that standard. It appears to us that S. 2203 is high-sulfur coal market protection legislation, pure and simple. It will phase out, and ultimately prohibit, the use of low-sulfur coal, which is now the most reliable and generally the least costly means of reducing SO_2 emissions.

In conclusion, Mr. Chairman, I would urge the committee in the strongest way to return and to build on a cost-effective approach the committee has pursued during the past years. In this regard, we would urge the committee to consider S. 2813 instead.

Thank you, Mr. Chairman, for a chance to share our views with the committee. I would be pleased to answer any questions.

Senator STAFFORD. Thank you, Mr. Storey.

Next we will hear Mr. Kerch, who is the manager of Air Quality Activities, Consolidation Coal Co.

Mr. Kerch.

STATEMENT OF RICHARD L. KERCH, MANAGER, AIR QUALITY ACTIVITIES, CONSOLIDATION COAL CO.

Mr. KERCH. Thank you, Mr. Chairman. My name is Richard Kerch. I am manager of air quality activities for Consolidation Coal Co., which is a subsidiary of Conoco and Du Pont. I appear here today on behalf of the Du Pont group of companies.

In the short time allotted to me, I would like to make two points: One, that S. 2203 will not work; and No. 2, that the costs to Du Pont companies of compliance with this bill are very large.

Setting aside for the purposes of this hearing the question of, whether there is a demonstrated need for the proposed legislation, this committee should insist that proposals embodied in S. 2203 will produced some measureable environmental improvement. They do not. No goals are stated in the purposes section of the bill, nor are any environmental targets given in the legislative language. This bill simply assumes that some environmental good will befall the Eastern United States. All we know in advance is that it will be very expensive to implement and it will result in reduced emissions of sulfur dioxide.

The premise that reducing SO_2 emissions will improve the quality of precipitation or environmental quality in the Northeast is seriously flawed. Scientists now have reason to believe that the atmosphere will behave in a strongly nonlinear way. Reductions of 50 percent of sulfur dioxide concentrations in the ambient air of New England will yield reductions in wet-deposited sulfate in New England of only about 14 percent. We believe that the impact of Northeast emissions have been underestimated by the authors of S. 2203, because many Northeastern States which are making an emission contribution will not have to make a reduction contribution. So, even the 14 percent reduction that would be expected in wet sulfate deposition will not be realized.

We know as well that this bill will essentially ignore the significant role that other pollutants play in atmospheric chemistry. It also ignores the significant reductions already made in sulfur dioxide emissions over the past 13 years.

Using sulfur dioxide emission reduction as a surrogate for raising the pH of rain, or reducing the wet deposition of sulfate will prove a failure.

In addition to the ineffectiveness of the bill from an environmental viewpoint, the bill will also be enormously expensive for U.S. electric power consumers and industry. As an example, Du Pont operates more than 100 boilers with heat inputs greater than 100 million Btu's per hour. Approximately 40 percent of these units will be over the age of 35 by 1991. Under section 2(a) of S. 2203, these boilers will be subject to NSPS for SO_x and NO_x.

We estimate that the compliance costs in 1991 will be $140 million in capital expenditures and $40 million annually in increased operation and maintenance. By the year 2005, new capital investment requirements under the bill will have grown to $225 million and the operating and maintenance cost penalties will have increased to $60 million annually.

This $225 million investment will only buy a 0.3-percent reduction in the national SO_2 emission inventory, at a cost of nearly

$2,960 per ton of SO_2 removed. In our view, this is an exorbitant cost.

Electrical costs will be significant for Du Pont because we consume about one-half percent of all the electricity generated in the country.

Du Pont also estimates the cost to retrofit SO_2 controls to sulfuric acid processes will exceed $40 million.

Section 2(b) would also add an additional requirement for existing emission sources. The requirement that any NO_x control technology demonstrated for existing sources in any of the 25 OECD countries, ignores practical differences which may exist among industries in different countries. There is no provision for economic reasonableness; merely the demonstration in any OECD country triggers the obligation for EPA to require similar action here.

The open-endedness of this provision is troubling. It is impossible to foresee what manner of NO_x reductions might be demonstrated in another country, or how that technology would work here.

Finally, section 3(h) of the bill, limiting sulfur in diesel fuel, would lead to large new costs for Conoco's petroleum refining. Our analysis shows that Conoco would spend well over $100 million in capital and increase its operating costs by $15 million annually to build and operate the systems necessary to comply with the 0.05 weight percent sulfur cap in the bill. Importantly, this investment would have to be made almost immediately. Since Conoco produces about 3 percent of the diesel fuel in the United States, it can be inferred that the national costs of this provision are in the billions and will have to be made in the very near future. The consumer price of diesel fuel could increase by about 5 cents per gallon and would result in the control of only 2 percent of the SO_2 in the atmosphere.

Mr. Chairman, we oppose passage of the bill.

Senator **STAFFORD**. I gathered that from most of your statement.

The next witness will be Mr. Charles Henderson, president of the Clean Coal Coalition, Inc., also of Washington.

STATEMENT OF CHARLES B. HENDERSON, PRESIDENT, CLEAN COAL COALITION, INC.

Mr. **HENDERSON**. Thank you, Mr. Chairman. I am Charles Henderson. I am senior vice president of Atlantic Research Corp., located in Alexandria, VA, and I am appearing today as president of the Clean Coal Coalition. This is an organization of companies that are dedicated to the development of flexible, least-cost air emission control strategies. We are comprised of a number of companies representing a wide spectrum of activities, industrial users, electric utilities, gas utilities, equipment manufacturing, coal processing, engineering, and consulting.

The coalition urges the enactment of Federal acid rain legislation which recognizes that there are cost-effective control methods in addition to flue gas desulfurization. We believe that Senate bill 2203 does require flue gas desulfurization.

Scrubbers are but one of many options for controlling sulfur dioxide emissions. The Federal statutory requirement should not dictate or operate to dictate flue gas scrubbing as the only or favored emission control technique.

The coalition recommends three approaches for the committee's consideration: First, acid rain legislation should maintain flexibility for achieving emission reduction targets, including the blending of different options. There are three important points I would like to make which would favor flexibility in Federal policy to allow the use of coal cleaning, for example, in achieving initial or interim emission requirements.

First, coal cleaning available now is the universal clean coal retrofit technology, which can be applied to all coal-burning facilities, whether large or small, old or new, as well as those that are planned in the future. Favorable results can be realized in the near term with older facilities, about which some owners argue little progress can be made.

Second, coal cleaning technology is the most cost-effective and cost-beneficial control method in terms of the amount of sulfur removed. This has been recognized by an Environmental Protection Agency report which states that: Physical coal cleaning is the least-cost method of reducing sulfur emissions from the combustion of coal. These points are elaborated in the paper which is included here with my testimony.

Third, coal cleaning is environmentally more beneficial than scrubbing when secondary factors are considered. Scrubbers are complex chemical plants that are known to be susceptible to failure. They create large amounts of sludge, the disposal of which has not been effectively evaluated. Needless to say, these problems have far-reaching implications under hazardous waste disposal requirements and resource recovery objectives.

The second point is that acid rain legislation should accelerate wider use of coal cleaning and combustion technologies. Since coal cleaning and combustion technologies are universally applicable, cost effective, and environmentally beneficial, acid rain legislation should encourage their further development and use. This objective was thought to be one of the objectives of the clean coal technology program, as conceived by the Congress.

As presently implemented, however, none of the CCT projects selected to date would further develop precombustion coal cleaning. This is not meant to be a criticism of the projects selected. It may mean that there are other factors or constraints which rendered the selection impossible. The fact remains, however, that the full potential of coal cleaning technologies is not now being addressed.

The third point that I would like to make is that acid rain legislation should accelerate the development of innovative coal cleaning and combustion technologies to address long-term control requirements. Long-term acid rain control requirements should permit the use of innovative coal cleaning technologies which are cost effective and environmentally sound. It should encourage the further use of advanced physical coal cleaning and also for methods for removing organic sulfur, which known physical methods cannot attack.

Microbial coal cleaning, now in the research and development stage, offers great potential for removing organic sulfur from coal, found in widely divergent sources throughout the United States.

My own company, Atlantic Research Corp., has pioneered the development of microbial coal cleaning methods. We have developed the microorganism designated CB1, which attacks the sulfur in coal, the organic sulfur, but not the carbon. It acts mainly by the oxidation of certain organic sulfur compounds to a sulfate which can be then washed away.

Research is now in progress to examine larger, scaled-up applications and the economics thereof. Initial data indicates that we can remove up to 40 percent of the thiophenic sulfur by CB1, and this process can be most cost effective. This would enable taking in North Appalachian coal which might have between 2 and 3 percent sulfur and reducing the sulfur content below 1 percent. Research and development needs to continue on new organisms that will remove other forms of organic sulfur present in most coal.

A further report on this subject is also attached to my testimony here.

This completes the coalition's statement. I thank you for the opportunity. I would be glad to respond to your questions.

Senator STAFFORD. Thank you very much, Mr. Henderson.

Now we will hear from you, Mr. Shaw.

STATEMENT OF JAMES W. SHAW, GENERAL MANAGER FOR COAL DEVELOPMENT, ROCKY MOUNTAIN ENERGY

Mr. SHAW. Thank you, Mr. Chairman. Members of the committee, my name is James W. Shaw, and I am the general manager for coal development, Rocky Mountain Energy Co.

I am presenting testimony this morning on behalf of Mr. James C. Wilson, the president of Rocky Mountain Energy Co. and I ask that his full written statement be a part of the hearing record.

Senator STAFFORD. Without objection, it will be.

Mr. SHAW. Rocky Mountain Energy is the mining subsidiary of Union Pacific Corp. We appreciate this opportunity to appear here this morning. Rocky Mountain Energy Co. is one of the very few members of the business community that has openly and actively supported acid rain legislation. We have done so because, No. 1, we believe that passage of such legislation is inevitable; second, that there doesn't appear to be any good reason to delay such legislation; and third, because we want to be a participant in the debate that forms that legislation.

We believe that there are two overriding public policy considerations which must be a part of any acid rain bill. The first one is that we believe that it absolutely must be cost effective. As we legitimately internalize the impacts associated with the combustion of fossil fuels, we must allocate our resources efficiently. We also believe that cost-effective means that any such legislation must encourage or at least be neutral toward the development of new technology. The second principle is that existing polluters must pay for the cleanup, as others have.

Mr. Chairman, you, this committee, Rocky Mountain Energy Co., and many others have worked hard to forge a compromise piece of legislation that would solve the acid rain problem. We are afraid that S. 2203 will derail that progress and set us back. Let me explain why we feel that way.

We feel we must oppose S. 2203 because it violates one of our guiding principles: It's not cost effective. We believe, in fact, that it may be one of the most costly and least efficient bills that has yet been submitted. We believe that it is nothing but a massive forced-scrubbing bill. Let me relate to you in the short time available this morning one specific piece of information that I am particularly familiar with that will illustrate that point.

There seems to be a belief with what I call the "low-sulfur myth," that there are significant amounts of coal which, when burned directly, can meet a standard of 0.7 pound of SO_2 per million Btu's of heat input. I realize there have been reports prepared which have suggested that, and I understand this committee has heard testimony to that effect.

Mr. Chairman, I don't believe that is true. Our coal work has involved the use of massive amounts of data from the Bureau of Mines, from the Department of Energy, from the Department of the Interior, from the Federal Energy Regulatory Commission, Keystone Manual, and many, many mine-specific reviews that we have conducted. There is very little coal that can meet that standard directly.

Let's take a look at 1985 data submitted to the Federal Energy Regulatory Commission by utilities on coal shipments. You have heard testimony that there is 63 million tons of annual capacity in 1985 that would meet that standard. But that was on an annual average basis. If you take a look at that very same data a little more closely, you would find that you eliminate mines that only satisfied some of their contracts. The mine wasn't continuously shipping coal of contract quality. Therefore if you throw out the data from those mines that only met the standard for some of its contracts, you're down to 42 million tons of annual capacity.

Then, if you go back and you look even closer, and you look at monthly shipment data, you would find that only 16.9 million tons of annual capacity met it on a month-to-month basis.

Then, if you go back and add one more piece of information to that, you take a look at 1984 and 1986 data, in addition to 1985, you would halve it again.

There just isn't very much coal in the United States today that can meet that particular standard when combusted directly. If you look at all the reserves nationally on the same basis, saying that 0.7 is an absolute maximum limit and you look at a mine's ability to produce that standard day in and day out, year in and year out, there is very little coal that can meet the standard.

I would like to summarize very briefly. We believe that S. 2203 is simply coal market protection legislation, or a forced-scrubbing bill. We don't believe that it will enhance the cause of acid rain, because we are afraid it is going to drive away supporters, break up some of the coalitions you have worked so hard to put together, and that it is going to arm the opponents of legislation with some new weaponry.

Mr. Chairman, we urge you to drop S. 2203 and build your compromise legislation around another bill, like S. 2200 or S. 2813. Thank you.

Senator **Stafford**. Thank you, Mr. Shaw.

Mr. Kerch, I was not going to ask any questions, but in connection with your testimony you said, "We know as well that this bill essentially ignores the significant role that other pollutants play in atmospheric chemistry." Generally, criticism of S. 2203 has been that it includes too many other pollutants in connection with atmospheric chemistry. I wonder, what we have ignored, in your opinion, as far as pollutants are concerned?

Mr. **Kerch**. Well, I think you have heard very vividly from your first witness that oxidants, and in particular, ozone, seem to be playing a very important role in what is happening in the atmosphere. Ozone is not emitted directly as an air pollutant by any source; it is a product of atmospheric chemistry resulting from organic compounds and oxides of nitrogen. So, primarily what I was thinking of is that if you're going to have an effective bill, you have got to at least have considered these pollutants.

Senator **Stafford**. Well, thank you. If you will examine the bill further, I think you will find that we do attack the questions of nitrous oxides and of ozone by going to their sources.

In any event, gentlemen, might I ask each of you, to the extent that you have a direct interest, to supply a summary of all coal delivered to the utilities that you represent, including mine-mouth generation utilities, in 1984 and 1985, including the sulfur content, heat value, and ash retention. We would appreciate that information.

Senator **Durenberger**. Mr. Chairman, could I just inquire about the value of that. I am not questioning the chairman. I am wondering what we hope to learn from that.

Senator **Stafford**. I would say to my colleague it would give us a feel for the sulfur content in coal.

Senator **Durenberger**. Thank you very much, Mr. Chairman.

[Information requested follows:]

ROCKY MOUNTAIN ENERGY

A Subsidiary of
[illegible]

October 28, 1986

Senator Robert T. Stafford
Chairman
Committee on Environment and Public Works
SD-410 Dirkson Senate Office Building
Washington, D.C. 20510

Dear Senator Stafford:

During my testimony before the Committee on Environment and Public Works on October 2, 1986, regarding acid rain legislation, you asked me to provide certain information concerning coal Rocky Mountain Energy (RME) mines. You asked, to the extent that RME has a direct interest, to supply a summary of all coal delivered to utilities in 1984 and 1985. In addition to the amount, you asked for data on the coal's sulfur content, heat value, and ash content.

Attached are tables which provide that information for the mines in which RME has an interest. The data are summarized on an annual average basis. We have also included data on the first half of 1986. This data is from the same publicly available sources which I utilized in the preparation of my testimony.

I believe this responds to your question. If it does not or I can provide additional information which will be useful to the Committee, please let me know.

Sincerely,

J. W. Shaw
General Manager
Coal Development

Attachment

[illegible]
Box 2000
[illegible]
303 469 8844

* *

PROSPECT POINT

* *

Company: PROSPECT POINT COAL COMPANY
Mine: LEUCITE HILLS
State: WY

					Delivered Coal Specs.			
	Market	Plant	St	Tons (000's)	Btu	% Sulfur	Lbs SO2	% Ash
1984	TENNECO	GREEN RIVER	WY	260	9797	0.54	1.10	0.25
1984	INDUSTRIAL / RETAIL			9	n.a.	n.a.	n.a.	n.a.
1985	PACIFIC P & L	BRIDGER	WY	194	9774	0.58	1.19	9.17
1985	TENNECO	GREEN RIVER	WY	275	9827	0.55	1.12	0.68
* 1986	PACIFIC P & L	BRIDGER	WY	75	9791	0.56	1.15	0.61
* 1986	TENNECO	GREEN RIVER	WY	132	9840	0.56	1.14	0.34

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* Figures represent January through June

* *

NEMO

* *

Company: NEMO COAL COMPANY
Mine: NEMO
State: MO

	Market	Plant	St	Tons	Delivered Coal Specs.			
				(000's)	Btu	% Sulfur	Lbs SO2	% Ash
* 1985	ASSOCIATED ELECTRIC	THOMAS HILL	MO	42	10565	4.39	8.31	10.80
* 1985	INDUSTRY / RETAIL		MO	10	n.a.	n.a.	n.a.	n.a.
1986	ASSOCIATED ELECTRIC	THOMAS HILL	MO	416	10486	4.33	8.30	12.01
1986	INDUSTRY / RETAIL		MO	77	n.a.	n.a.	n.a.	n.a.

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* Figures represent December only; mine acquired Dec. 1

MEDICINE BOW

Company: MEDICINE BOW COAL COMPANY
Mine: MEDICINE BOW
State: WY

					Delivered Coal Specs.			
	Market	Plant	St	Tons (000's)	Btu	% Sulfur	Lbs SO2	% Ash
1984	IOWA PUB SVC	NEAL	IA	512	10118	0.64	1.27	9.87
1984	KANSAS P & L	JEFFREY	KS	51	10122	0.64	1.26	10.70
1985	IOWA PUB SVC	NEAL	IA	279	10115	0.65	1.28	10.02

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* Figures represent January through June

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CARBON COUNTY

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Company: CARBON COUNTY COAL COMPANY
Mine: CCCC #1
State: WY

	Market	Plant	St	Tons (000's)	Delivered Coal Specs.			
					Btu	% Sulfur	Lbs SO2	% Ash
1984	NORTHERN IN PUB SVC	MICHIGAN CITY	IN	68	11089	0.52	0.95	5.68
1984	NORTHERN IN PUB SVC	MITCHELL	IN	767	11102	0.52	0.94	5.64
1984	NORTHERN IN PUB SVC	BAILLY	IN	32	11066	0.52	0.94	5.90
1984	NORTHERN IN PUB SVC	SCHAHFER	IN	431	11085	0.52	0.95	5.82
1985	NORTHERN IN PUB SVC	SCHAHFER	IN	425	11081	0.54	0.97	5.77
1985	ILLINOIS POWER	HAVANA	IL	21	11159	0.42	0.75	5.20
1985	NORTHERN IN PUB SVC	MITCHELL	IN	543	11109	0.53	0.95	5.72
* 1986	NORTHERN IN PUB SVC	SCHAHFER	IN	202	11296	0.55	0.97	7.95

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* Figures represent January through June

BLACK BUTTE

Company: BLACK BUTTE COAL COMPANY
Mine: BLACK BUTTE
State: WY

					Delivered Coal Specs.			
	Market	Plant	St	Tons (000's)	Btu	% Sulfur	Lbs SO2	% Ash
1984	COMMONWEALTH EDISON	WAUKEGAN	IL	973	9566	0.59	1.23	7.79
1984	COMMONWEALTH EDISON	FISK	IL	175	9550	0.59	1.24	7.87
1984	COMMONWEALTH EDISON	CRAWFORD	IL	512	9544	0.59	1.23	7.68
1984	COMMONWEALTH EDISON	WILL COUNTY	IL	1123	9543	0.59	1.23	7.64
1984	COMMONWEALTH EDISON	JOLIET	IL	1464	9566	0.56	1.18	7.62
1985	FREMONT DEPT UTIL	WRIGHT	NE	9	9660	0.38	0.79	6.40
1985	COMMONWEALTH EDISON	FISK	IL	195	9555	0.53	1.11	7.64
1985	COMMONWEALTH EDISON	WILL COUNTY	IL	970	9538	0.53	1.12	7.64
1985	COMMONWEALTH EDISON	JOLIET	IL	2142	9516	0.53	1.11	7.64
1985	COMMONWEALTH EDISON	WAUKEGAN	IL	1272	9521	0.53	1.12	7.59
1985	COMMONWEALTH EDISON	CRAWFORD	IL	758	9546	0.55	1.14	7.63
* 1986	COMMONWEALTH EDISON	WILL COUNTY	IL	911	9560	0.45	0.95	7.40
* 1986	COMMONWEALTH EDISON	WAUKEGAN	IL	569	9564	0.46	0.95	7.38
* 1986	COMMONWEALTH EDISON	FISK	IL	174	9555	0.44	0.92	7.42
* 1986	COMMONWEALTH EDISON	JOLIET	IL	1084	9564	0.46	0.95	7.38
* 1986	COMMONWEALTH EDISON	CRAWFORD	IL	454	9562	0.46	0.95	7.37

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* Figures represent January through June

Senator STAFFORD. I will have no further questions. I will say I appreciate your coming here, and I understand your viewpoint. No bill is perfect, and the reason for these hearings is to try to get input from people who will be affected so we can understand better the job that we are facing here on the committee.

Senator Burdick.

Senator BURDICK. Mr. Chairman, it seems to me that the consensus of the panel is that S. 2213 is preferable to S. 2203. As I understand the testimony, S. 2203 limits the technologies to scrubbing alone; is that correct?

Mr. HENDERSON. That's correct.

Senator BURDICK. And that you gentlemen believe that there are alternatives that are as effective. All I know is from my own experience, our plants in North Dakota are scrubbed, all of them. Are there studies to indicate that the washing of the coal and this other technique is as effective as scrubbers? Whoever wants to answer that may do so.

Mr. HENDERSON. It's certainly not effective at the present time, but I believe that in the future, if technology continues to be applied toward the cleaning of coal, that it will be as effective as scrubbers, that it will be lower cost, and that since you won't have the sludge coming out from the utility, it will be environmentally preferable.

But that technology is not here today. It will be here sometime in the early 1990's.

Senator BURDICK. Well, I wish you had let us know because we spent 25 percent of the cost of the plant in scrubbers. If there was a cheaper way, we would like to have done it. But you think there is hope that other techniques such as scrubbing and clean-coaling, whatever you call it, will eventually be as good?

Mr. HENDERSON. Yes, I do.

Senator BURDICK. But it's not here now?

Mr. HENDERSON. Not here now.

Senator BURDICK. Thank you.

Senator STAFFORD. Senator Durenberger.

Senator DURENBERGER. Mr. Chairman, thank you very much.

I want to begin by complimenting Mr. Shaw for being here in Jim Wilson's place, and I want to compliment Rocky Mountain for their support for doing something about acid rain legislation in general.

Mr. SHAW. Thank you, Senator.

Senator DURENBERGER. For the record, I want to show that the Northern States Power Co., which is an institution that operates in my area, has also been supportive.

I would also reflect, Mr. Chairman, my concern for the fact that this bill doesn't solve the problem and may very well be one of those bills where I would say, "Curtis, you've gone too far." I think the critique in terms of forced scrubbing is an appropriate critique.

I think we, as we try to deal with this problem, can deal with the issue of is that the best way to go about it. I think this is clearly a forced-scrubbing bill. Whether it's anti-low-sulfur, I think it's my prerogative to try to deal with it because there are a lot of your colleagues in the coal business, Mr. Shaw, who would say that a lot of previous regulation in this country was anti-high-sulfur and very pro-low-sulfur coal.

What I like about the bill—before Curtis thinks I have turned on acid rain—is that it's yet another approach in this myriad of approaches to the problem. I think one of the things we have all been searching for is some way to bring the coal industry into the act in some way that doesn't say, "We don't have a problem, but if you policy makers would do something about facing up to the realities of our economic interests in the larger sense, not just of the coal industry but of the United States of America and its dependence on fossil fuels, we would be happy to participate in a program that is cost effective."

I agree with the testimony that I have heard here that this approach is not cost effective. I don't think this approach is cost effective. But then, I don't think the original Stafford-Mitchell approach was very cost effective either. I think that until we go back to the old Bill Ruckleshaus suggestion of 14, 15 years ago, where we used the marketplace in this country and we used the emitter pays kind of principle, giving emitters the choice of whether they want to pollute or they want to do something about an alternative reduction, we aren't going to solve this problem.

But I think it is also clear that until we recognize America's dependence on fossil fuels and the role that—whether it's low- or high-sulfur coal—plays in that, I doubt, Mr. Chairman, whether we're going to find a solution either.

So, I think this particular industry that is represented here is politically crucial to the solution to this problem, because I agree with them that this bill and a lot of other bills, particularly that electric emissions tax over on the House side, ignores the past contributions that have been made by electric power consumers in America, to say nothing of their utilities, my State in particular. We have contributed millions and millions of dollars to solving the acid rain problem while Ohio has contributed nothing, and they are sitting out there making all the problems.

So, national legislation must recognize the differences in these contributions.

I also agree that, to a degree, this bill ignores the present deposition contribution of other emitters. That certainly is true, but I don't know that this was designed to be the be-all and the end-all. I think it was designed to present us another approach to the problem.

My sense, Mr. Chairman, of where we're headed with this is we are probably headed in the direction of ozone legislation with acid rain components or something like that. As I listened to this conversation and the work of this committee, we seem to be getting closer and closer to the greenhouse, and I just hope we don't get too far away from the streams and the lakes and the forests and the contribution that sulfur dioxide and NO_x has.

Now, just having said that, and particularly what I have said about the coal industry, is it the view of this panel that we ought to do something in America in some way about restraints on sulfur dioxide and nitrogen oxides and whatever other emission, or is there no atmospheric pollutant problem, is there no acid rain problem, are we fine just sort of letting things go the way they are so that Minnesota keeps cranking up on its part of it and a few other States keep doing their part of it but the rest of the country can sit there and not make a contribution?

Mr. KERCH. I would like to answer that question. In our view, with regard to sulfur dioxide only, the framers of the Clean Air Act did a pretty good job the first time around. With the amendments of 1977, we think that the acid rain problem, to the extent that it is tied to sulfur dioxide, is largely going to be self-correcting. Emissions are going to go down as old plants retire and new ones come on line.

The question really is: Do you have the time to wait for that natural reduction, or is there some environmental crisis that suggests that you have to do it sooner than that?

We don't see the evidence for sooner, so we think that the present Clean Air Act will provide the reductions necessary in the long haul.

Mr. HENDERSON. I think there should be Federal legislation. I just don't think it should be of this type, that's all. In fact, I like your marketplace idea, and I think that is the one best way to get the least-cost control of sulfur dioxide and nitrogen oxides as well, is let the emitter pay, pay a small amount in the beginning and have it gradually increasing, and you will solve the problem that way.

Senator DURENBERGER. What bothers me is that from our trip this committee took last year to Scandinavia, Germany, and Switzerland, is that in 1979, 1980, and 1981, in those countries they were saying: No problem. By the end of 1981 and into 1982 and 1983, they realized—I mean, so quickly—the combination of rainfall or no rainfall and the combination of a variety of other factors, this thing just started rolling.

So, I guess I am bothered by the maybe we have time argument, but I just don't know that we have time. The evidence in other places suggests that acidification is a combination of various factors and if you get some coincidence of various factors with the presence of sulfur dioxide or NO_x contribution, it may come fairly quickly.

I thank you, Mr. Chairman, for scheduling these hearings and this panel.

Senator STAFFORD. Thank you, Senator.

Senator Baucus.

Senator BAUCUS. Thank you, Mr. Chairman.

Gentlemen, I apologize for coming a bit late, so I don't know which one of you is most qualified to address the question I have. It really goes to the quantity of low-sulfur coal in America. I think it was maybe you, Mr. Shaw, who came in addressing that. I wonder if you, or any of you, could flesh out more accurately and at least more precisely your views on the quantity of recoverable low-sulfur coal, at least coal that might be able to reach the 0.7 standard.

At an earlier hearing on this subject, there was a witness who had testimony to the contrary; that is, that there was a lot of low-sulfur coal available. In fact, he said that in his analysis, he looked at recoverable and the size of the seams and how much overburden and so forth. It wasn't just a theoretical figure. He factored out the very small-seamed coal and heavy overburdened and availability and so forth.

If you have a different view, any of you, it would help if you could more precisely explain why you think there is less, and your authority and how you arrive at your results, et cetera.

Mr. SHAW. Sir, we have looked at exactly the same data that the previous witness looked at, and we cannot reproduce a similar analysis of the data.

We can't reproduce some of the numbers from the very same data. As I said, part of it, I think, depends upon your interpretation of what you mean by that standard. We have interpreted it in its literal sense; that that would be the emission limit: 0.7 would be a not-to-exceed limit.

With that assumption you can calculate back for each different heating value of coal, how much sulfur would be allowed in each type of coal. Then you can look at the best—source of information—producing mines. We looked at producing mines that were delivering generally low-sulfur coal and asked: If they had a contract to deliver coal where that standard could not be exceeded, could they do it? We utilized coal shipment data that is sent to the Federal Energy Regulatory Commission by the utilities. The data showed that there are a lot of mines that can meet the standard every now and then on a random shipment-by-shipment basis. However, if you had a not-to-exceed contract, you get down to literally a number of mines that you can count on one hand. Only they do it regularly.

Senator BAUCUS. So, how much coal do you think would be available? What is your number? What supply for how many years, in any way you want to quantify it, just in terms of hard numbers?

Mr. SHAW. Yes. We were able to come up with—let me answer it in two ways. We came up with four mines that we thought, based on data that we have been able to look at, the data on coal they have shipped over a period of time as well as information in multibasin studies, multiclient studies of coal basins and so forth, four to five mines that can do it regularly. Those mines currently produce about 10 million tons a year.

If you expand that and look at the literature, you will find that the Bureau of Mines did an extensive piece of work a long time ago, where they tried to correlate coal quantity and quality data and put overall coal reserve data in categories. That data is not organized in a way that lets you look at it directly, because it ranks coal by tons and by sulfur content, and not by sulfur level per million Btu's. You have to make assumptions about what the Btu content would be for those different categories. We have come up with something like 7 billion tons that we think one could assuredly assume will meet a 0.7 $SO_2/10^6$ Btu standard. Remember, this is just from total reserve data. Looking at total reserve data tells you nothing about the location or availability of that coal.

Now, that is something like about 10 years of coal at the current national level of coal production.

Senator BAUCUS. That is 10 years' worth of coal, you say?

Mr. SHAW. U.S. production is something like 860 million tons a year. Therefore 7 billion tons would represent something like about 9 years of production.

Senator **Baucus**. You would come up with 7 billion tons roughly?

Mr. **Shaw**. That does not mean all of that coal is mineable; it just means that using gross reserve numbers that we feel quite confident there is 7 billion tons of coal that would meet a 0.7 standard if combusted directly.

Senator **Baucus**. What were those four mines that you looked at? Which mines were those?

Mr. **Shaw**. They are the Antelope and North Antelope mines in the Powder River Basin, Sufco in Utah, and Spring Creek in Montana. We couldn't find any shipment data that implied they couldn't meet that standard. However, they are in basins surrounded by mines which do have problems from time to time meeting that standard. So, it's not clear that the problem isn't just lack of data and that these mines too may not be able to sign long-term contracts to supply that low-sulfur coal.

Senator **Baucus**. Does anyone else have any view on this availability?

Mr. **Storey**. Senator Baucus, I just would comment from the low-sulfur-coal perspective and really not addressing that issue. But we certainly agree with what has just been given you. But the low-sulfur coal industry today produces about 340 million tons of coal. We have excess capacity of another 200 million, which we have about total capacity of 500 million, and we are operating on a reserve base of about 217 billion tons. So, I think that is pretty evident that the low-sulfur coal industry will have an ample supply for centuries. So, that does not mean that low-sulfur coal will meet, as you have just discussed, the 0.7 requirement.

Senator **Baucus**. The second question is what new technologies are there—the question Senator Burdick addressed—to bring more coal in conformance with the 0.7 standard? Senator Burdick asked the question, and the response was, "Well, yes, there are new technologies coming, but it will take some time."

Could any of you outline what those technologies are and how much more coal you think could therefore be available to meet the percentage increase, in tons of coal that would then be available to meet the new standard, and when they will be on line? Just flesh that out a little more precisely, if you could, please.

Mr. **Henderson**. Well, I addressed this a little bit in my testimony, but let me flesh it out a little bit. Coal cleaning, of course, is done to a large extent now on much of the coal in the United States. It is physical coal cleaning that attacks primarily the pyritic sulfur in coal and does and can result in significant decreases in the sulfur content. It does not attack the organic sulfur, which is not removed by any of the physical processes. To get rid of the organic sulfur, you need to apply either a chemical technology or, as we are doing in my company, microbial technology. We have developed microorganisms that attack the organic sulfur in the coal, oxidize it in such a way that it can be washed away.

These technologies are on the laboratory scale status at the present time. It will take a number of years to commercialize primarily because of two factors: One, there are so many different kinds of coals in the United States and to do a good job on a significant number requires a lot of research. Second, when you're working with microorganisms, it's not like working with chemicals; you have to wait until they're ready to do what you want them to do, and that can take time. So, we don't believe that this technology will be available until the 1990's.

Senator **BAUCUS**. I know it's difficult to quantify this, but just give me your rough, gut assessment as to how much more coal these technologies will make available to meet the standard, if it's the law, by, say, 1995? Just your rough, gut guess, based on current state of technology.

Mr. **HENDERSON**. If the standard is 7/10ths of a pound of SO_2 per million Btu, I think it will make a significant increase, but it will not make all coal in the United States available.

Senator **BAUCUS**. 1 percent, 10 percent, 50 percent?

Mr. **HENDERSON**. Maybe a doubling the amount.

Senator **BAUCUS**. Doubling.

Mr. **HENDERSON**. But if you would increase that to, say, 1.2, I believe essentially all the coal in the United States can be made, in the 1990's, to meet that standard.

Senator **BAUCUS**. So, you are saying that, yes, these technologies are significant?

Mr. **HENDERSON**. Yes.

Senator **BAUCUS**. They are going to help significantly?

Mr. **KERCH**. I would like to answer that question as well. The gentleman to my right is talking about coal cleaning technologies, and I think, at least in our viewpoint, the ones that we should be banking on the most ought to be the cleanup technologies or the combustion cleanup technologies. By that, I mean fluidized bed combustion or combined cycle type technologies, which in terms of the fluidized bed is already a proven technology at subutility scale and what we need are some demonstrations so that the utilities can feel comfortable in using them.

We already have a combined cycle plant built in California that is working well, and there probably needs to be some more of that technology looked at. Those technologies are not going to be available by 1991 for utilities, however, so I think the answer is those technologies aren't going to help satisfy the initial response to S. 2203.

On retrofit technologies, we like limestone injection, and again there should be some investment in moneys to try to bring these to utility scale. Some money is already invested in the clean coal technology bill to do that. But again, a 1991 trigger is probably going to preempt a lot of that from being available in the timeframe that the utilities are going to have to respond to this bill.

Senator **BAUCUS**. Who is making the best effort; that is, trying to find the best technology, the most effective, most efficient? Are there any companies you can think of? Is this clean coal technology bill we passed helping? Who is doing the best job in this?

Mr. **KERCH**. Too soon to know, I think.

Senator **BAUCUS**. Well, who do you think is? I mean, who is working on this?

Mr. **KERCH**. Well, I happen to think we're doing an awfully good job in our own coal research division.

Senator **BAUCUS**. Glad to hear that. Are we making enough effort in this area, or have we spent enough money, too much money, about the right amount? What is your assessment of that?

Mr. **Kerch.** Well, if you spend everything that you have talked about spending, we think that there is a pretty good chance—and if you're smart in selecting the projects; those are two big "if's"—if you spend all the money and if you're smart in the selection process of the projects you fund, then we're probably making a fairly reasonable attempt at developing new clean coal technologies.

Senator **Baucus.** Well, I appreciate that. I urge you to keep moving very quickly. There is a company in Montana that is—Montana Power Co., for example—Western Energy has just announced it's spending $350,000, and a matching grant will be available by a Montana organization, it's called the Montana Science and Technology Development Board. That is about $700,000 on coal drying, trying to develop that technology.

The consequence—there is an article I would like to submit in the record, Mr. Chairman, on this—but Montana Power feels that as a result, with this upgraded coal, it will have a moisture content as low as 1 percent, and sulfur content as low as 0.3 percent, and a heating value of up to 12,000 Btu's. I don't know if it's going to work out. I hope it does. But anyway, it's an effort that a company is trying to make, and I think that with efforts like this, we will get further along than we might think at this point.

Thank you, Mr. Chairman.

[The article referred to by Senator Baucus follows:]

[From the Billings Gazette, Sept. 23, 1986]

COAL-DRYING STUDY GETS NEW FUNDING

BUTTE (AP).—Western Energy Co. has accepted a matching $350,000 investment from the Montana Science and Technology Development Board to continue research and engineering studies on an innovative coal-drying process.

The Montana Power Co. subsidiary announced the grant Monday and said it would provide at least $350,000 to continue efforts to make Montana's coal more competitive.

"The coal-drying process now represents a close working relationship between industry, the University System and the state," said William Robinson, the company's vice president of administration and technical services.

Western Energy has been the project director since 1981, and MultiTech of Butte, a division of Mountain States Energy Inc., has been the contract engineer. Montana Tech has provided consultants and research space.

Robinson said the investment by the Science and Technology Alliance will give Western Energy "a big boost, because finding dollars to support an emerging technology is difficult."

The Montana Science and Technology Alliance is the staff arm of the Science and Technology Board. It is a division of the state Department of Commerce and is funded by coal severance taxes.

Under the matching investment agreement, the alliance will receive royalties from actual dried-coal production and sales. Western Energy would not have to repay the investment if the process fails, but so far it reportedly looks promising.

MSTA executive director Samuel Hubbard said the alliance will receive a royalty of 60 cents per ton on production until the $350,000 plus 12 percent interest is paid back. Then it will receive additional royalties of 2 cents per ton for 10 years as a risk reward for investing in the project.

"We believe Western Energy's coal-drying process is an acceptable project," he said. "If successful, the process has the potential to enhance Montana's tremendous reserves of low-rank Western coal into a viable new product that should compete well in the marketplace."

Monroe Greene, an engineer for MultiTech, came up with the idea for the process.

The process takes Western coal—which normally contain 25 to 55 percent moisture, 0.5 to 1.5 percent sulfur and a heating value of 5,500 to 9,000 British thermal units per pound—and enhances the fuel through a cleaning and dewatering process.

The result is stable, upgraded coal with moisture content as low as 1 percent, sulfur content as low as 0.3 percent and a heating value up to 12,000 Btu per pound.

The company began testing the proposed process in pilot plants in 1981 and has successfully made continuous runs of 300 tons of subbituminous coal using the upgrading process, Robinson said.

While the coal is being dried, demoisturized coal is pulled from the ash, pyrites and other minerals. The fuel then undergoes a "dry-bed mechanical treatment" to separate the impurities from the product.

Robinson said Western Energy now plans to complete engineering for a demonstration plant at Colstrip that would dry 50 tons of coal an hour. It could be operational by 1988.

"We're at a point where we can really make this technology workable," Robinson said.

Mike Tuck, general manager of MultiTech, said the drying process adds value to the coal.

"The MSTA grant represents an investment in long-term markets for one of the state's basic resources, which at this moment is suffering from soft sales and intense competition," he said.

Montana Tech President Lindsay Norman said the coal-drying experiments are a classic example of how private industry, the University System and state government can work together to enhance economic development.

Senator STAFFORD. Thank you, Senator Baucus.

Are any of you gentlemen representing industries that are contributors to the atmospheric fluidized bed combustion plant that is being built out near Paducah, KY?

[No response.]

Senator STAFFORD. I know a consortium of coal producers and electric generators and others have all joined TVA in building the plant, which will be a 140-megawatt plant. That seemed to me to be one of the ways we could go, and burn even high-sulfur coal.

Well, thank you all very much. We appreciate your coming.

The next panel will be: Hope Donovan, legislative representative, Adirondack Mountain Club, Guilderland, NY; State Representative John Broujos, from the State of Pennsylvania; Ruth Duba, policy associate, Presbyterian Church of the United States; and Richard Kamp, director, Smelter Crisis Education Project, Portal, AZ.

It would be the Chair's intent to go with the witnesses as we have named you, which means that Hope Donovan, from Guilderland, NY, you would be the lead witness. I note Guilderland is a town just west of Albany, isn't it?

Ms. DONOVAN. That's correct, Senator Stafford.

Senator STAFFORD. I have a daughter living in Berne, which is just beyond Guilderland.

Ms. DONOVAN. Yes, our next-door neighbor. Very pretty part of the country.

Senator STAFFORD. All right, you are the first witness.

STATEMENT OF HOPE DONOVAN, LEGISLATIVE REPRESENTATIVE, ADIRONDACK MOUNTAIN CLUB, ACCOMPANIED BY EDWIN KETCHLEDGE

Ms. DONOVAN. Yes. First, Senator Stafford, I would like to thank you and members of the committee for this opportunity to be heard. But I would also say that there was some confusion because I had requested time for Dr. Edwin Ketchledge to speak with me. He is a forester, distinguished teaching professor emeritus, and he has a great deal to say about our Adirondacks. Is there another chair for him?

Senator STAFFORD. He can certainly come to the witness table.

Ms. DONOVAN. Please.

Senator STAFFORD. You may divide the time.

Ms. DONOVAN. All right. Thank you.

Well, as you say, I am representing the Adirondack Mountain Club, and this is a nonprofit membership organization started in 1922 and now has 12,000 members in 3 States. It is dedicated to furthering sound conservation policies and outdoor recreation, especially in the forest preserves.

We endorse this bill, S. 2203, that would reduce sulfur and nitrogen oxide emissions and increase controls on mobile sources. We believe this bill, when enacted, will resolve many problems plaguing our beloved Adirondacks.

New York State last year celebrated the 100th anniversary of the creation of the Adirondacks Park. In the 19th century the Adirondacks had been exploited, but thanks to the foresight of some of our earlier citizens, today this spectacular area is largely restored, and now it serves as watershed, playground, and as ecologic and scenic reserves.

The Adirondack Park is within a day's driving distance of 60 million Americans, and at 6 million acres, it is the largest area of wilderness in the East.

In setting these acres aside for future generations, the people of New York State confidently planed to preserve a large area of unspoiled natural resources. They could not have foreseen that pollution originating from beyond our borders would threaten and, in many cases, destroy much of it. The damage to the Adirondacks has been well documented. New York State reduced its own sulfur dioxide emissions by about a third in the 1970's. Only about 10 percent of the sulfates deposited in the Adirondacks originate in New York State, and our electric bills are far higher than in those States causing our problems.

Nevertheless, in 1984, in the absence of Federal action, New York passed legislation—this was the first in the country—that will further reduce our sulfur and nitrogen emissions to comply with the expected Federal legislation.

We hear that cleanup of acid-causing pollution will cost too much. How much will the damages cost if they are unchecked? Even with recommended controls, analysis shows that polluting States would still pay only about 75 percent as much for electricity as the affected Northeastern States.

Utilities traditionally overestimate the cost of controls and never mention the positive economic benefits of pollution abatement measures.

Is it fair that New York and other States and nations suffer from pollution over which they have no control? Would you sit back and let your next-door neighbor dump his garbage in your yard because he claimed that he could not afford to pay a proper disposal fee? Our relations with Canada and Mexico are at risk, too, and we are pleased that S. 2203 will address the international aspects of acid rain.

Congress must take a strong stand and act now to protect the health and welfare of not only New York State but of other areas of our country as well.

The Adirondack Mountain Club thanks you for the opportunity to offer these comments.

Senator **Stafford**. Thank you very much.

Now we will be happy to hear you, Dr. Ketchledge.

STATEMENT OF EDWIN H. KETCHLEDGE, ADIRONDAK MOUNTAIN CLUB

Mr. **Ketchledge**. Thank you. I have been involved in recent years in research on acid rain and the problem that plagues our region of the Adirondacks. But today I speak as a private citizen in support of the position of the Adirondack Mountain Club, of which I am a member and officer. We urge passage of S. 2203, the New Clean Air Act.

I wish to make three central points in explaining our deep concern on the issues at hand. No. 1, key to the matter is the fact that the Adirondack mountain region is ecologically the most sensitive and susceptible area in all of the Eastern United States to atmospheric pollution. Geologically, we are much like a giant granitic bathtub. Our 6 million acres are a single big rock, impervious to water. We lack subsurface drainage, and thus our acidified rainfall must drain off across the landscape, polluting some 3,000 miles of rivers and streams and 2,700 lakes along the way.

The matter is complicated by the fact our soils are very young glacial soils, only 10,000 years old, low in ability to neutralize atmospheric poisons and pollutants. Simply put, our waters and our soils do not have adequate buffering capacity to neutralize the foreign chemicals now flowing into them and damaging the systems they sustain.

Moreover, we happen to lie downwind and immediately under the major storm tracks whereby the midwestern regions export their industrial poisons out of their backyard and into ours.

Point No. 1, then, please, is we who receive the heaviest load of pollutants are endowed with the least ability to handle it.

Point No. 2, damage to aquatic systems. The biological impact of acidified deposition on aquatic ecosystems is relatively clear, direct, and linear. I believe few ecologists doubt the reality of it or the seriousness. Here in the Adirondacks, our aquatic systems suffer dramatically from the toxic effects of dissolved aluminum on fish life. The National Academy of Sciences has reported on our problem. The New York State Department of Environmental Conservation advises us that over 200 of our lakes are already devoid of fish, and we fear many more are on the threshold of collapse.

I think our biggest fear is that the declining fisheries are the forewarners of other subtle processes underway that in a decade or two will be manifest in declines of other natural resources, perhaps even our own health.

Point No. 2, then, is that aquatic ecosystem scientists accept lake acidification as a proved fact and an overwhelming consensus, please, for the Federal Government to get moving on controls to reduce sulfur and nitrogen emissions.

My last point is damage to forest ecosystems. The damage to forest ecosystems is less clear because most terrestrial ecosystems are far more complex, with more interacting variables and many buffering systems as compared with aquatic systems. This means that sulfur and nitrogen emissions compound rather than directly cause forest problems. The impact of the sulfur and nitrogen appears to be more an additional stress factor in systems already struggling with numerous natural forces.

Now here I will abide by time and just skip along further.

Point No. 3, then, is that keeping abreast of the technical and scientific literature on forest ecosystems, we realize that sulfur and nitrogen emissions are bad. They upset ecosystems and the problems continue. My plea in behalf of the Adirondack Mountain Club is that though we do not have answers to all the ramifications of acidified deposition, everyone acknowledges that sulfur and nitrogen levels must be reduced if we are ever to reverse the pollution which poisons our ecosystems.

I thank you kindly for the chance to speak for our membership.

Senator STAFFORD. Thank you very much, Dr. Ketchledge.

The next witness will be Mr. John Broujos. You are very welcome here.

STATEMENT OF HON. JOHN BROUJOS, STATE REPRESENTATIVE, STATE OF PENNSYLVANIA

Mr. BROUJOS. Thank you. It is an honor to be here, Senator.

As a representative of Pennsylvania, I am chairman of the Bipartisan Acid Rain Caucus. That caucus was formed in February 1984 to educate ourselves and the public and also to urge Federal action and also to seek State action if the Federal Government didn't act.

Pennsylvania is considered under some studies to be the second worst polluter. We pollute Canada and New York, and we are probably the worst recipient of pollution, which makes us, as Larry Schweiger of the National Wildlife Federation has stated, "in the eye of the acid rain storm." We estimate 30 percent is generated by us internally.

The subject I have been asked to talk about is the interaction of ozone and acid deposition as they affect crops. The subjects can be addressed separately. However, individually they do cause damage. They are serious. As they interact, there occurs this type of situation: The ozone will be the primary toxic agent which causes damage to plants. The plants then have some capability to repair that damage. However, the impact of acid rain inhibits that repair process.

It is interesting to observe that whereas scientists generally are relatively cautious with respect to the causation as to plants and crops from acid rain, there is no hesitation—and they are very emphatic in their conclusions—that ozone does cause significant damage.

Now, that ozone results, of course, from emissions of oxides of nitrate and so forth. However, the interaction is very wide. The scientists have also concluded that the environment—soil moisture, soil fertility, light intensity and quality, relative humidity, temperature, and biological disease—influence the magnitude of plant response to ozone.

The economic loss is substantial. It is estimated, in one study, to be $2 billion annually. On the other hand, there is no clear present prediction of crop loss from acid rain.

Another distinction between acid rain and ozone studies, in fact, is the length of study that has been conducted. The higher degree of certainty with respect to ozone results from almost 30 years of data and research. Studies on acid rain have substantially been conducted for about 10 years.

Scientists, of course, prefer to accumulate data over a long period of time through a variety of research institutions. The first task is to identify the best methodology, and there may be no clear-cut causal relationship in the initial phases; however, there may be indications.

Specifically, those indications have been demonstrated. Brookhaven and the University of Illinois scientists have found a type of soybean sensitive to acidic rain. Illinois has found that drought-stressed plants were more sensitive to acidic rain than well-watered plants. There are indications that the effectiveness of pesticides is adversely impacted by acid rain because it may cause a greater rate of wash-off from the leaf surfaces of the pesticide. Consequently, there is a potential for relatively high costs of production or less effective pesticide influence.

The study that has been going on with respect to forests has been addressed. There is no question that the recent conference that studied this matter in 1985, in the summer, concluded that there is clear evidence of a serious decline in growth of several species of trees in Europe and Eastern North America, and it has occurred where atmospheric deposition is high.

Penn State in Pennsylvania has conducted research in the ozone area for over 20 years. We are continuing that. The legislature has appropriated funds specifically for crop studies.

In conclusion, I would like to state that the States do prefer action by the Federal Government imposing Federal standards. However, we do like the features of House Resolution 4567 in that it sets Federal guidelines and standards with State execution and enforcement.

We do urge action. We would like to emphasize that despite the relative scientific uncertainty with respect to crops, there is substantial evidence with respect to damage to fish and aquatic life. There is increasing evidence with respect to forests, and we do not want anything that we would say with respect to crops to diminish that.

Finally, we want to emphasize that old military expression, "A good plan executed immediately is better than the best plan not executed at all." I would like to address just briefly the comments made by some of the speakers with respect to the coal industry. We cooperate with them. We have had an ongoing dialog with them. Consol gave me one of the finest briefings I have had in Pennsylvania, for one whole day in Pittsburgh, with respect to the efforts they are making. We applaud that. They have excellent lobbyists, John Chervansky and others, who are doing an excellent job.

But I would like to make one important observation on the cost factor. Most of the costs that have been cited with respect to introduction of control devices have included the costs of refurbishing obsolescent plants. That is an assumption that should not be there.

Consequently, the cost studies have to be looked at carefully and cannot be relied on in terms of a substantial cost to society.

Finally, there is no question that the cost to the environment now far exceeds the cost of retrofitting or any other device to reduce emissions. We urge Federal action.

Senator STAFFORD. Thank you very much.

I am going to have to recess the hearing for a moment. We have a rollcall in progress. I hope that Senator Burdick will be able to vote and get back here very quickly and get the hearing going again. But the chairman has to go over and vote, too. So, we will have to recess until one of us can get back.

[Recess.]

Senator BURDICK [presiding]. I believe our next witness is Ruth Duba.

You may proceed.

STATEMENT OF RUTH DUBA, POLICY ASSOCIATE, PRESBYTERIAN CHURCH OF THE U.S.A.

Ms. DUBA. Thank you. I am Ruth Duba, associate director of the Washington office of the Presbyterian Church, U.S.A. I am testifying today on behalf of the General Assembly of the Presbyterian Church, U.S.A., and the United Methodist Board of Church and Society. These two agencies have long had an interest in public health and environmental justice. We have participated in a National Council of Churches-sponsored task force on acid rain that includes representation from most major Protestant denominations. Together, we are committed to educate our constituents as to the causes of acid rain and associated air pollution and to recommend solutions to these problems that will be both ecologically sound and economically just.

In a 1984 statement issued in Toronto, Canada, our two agencies joined with 23 other United States and Canadian church bodies in calling for prompt action by both our Governments to confront the problem of acid rain and its associated pollution.

Among the public policy guidelines supported by this joint statement are: One, vigorous international and bilateral cooperation by the United States and Canada to control acid rain; two, cleanup of a sufficient magnitude to reduce emissions of sulfur dioxide and oxides of nitrogen to a level necessary to protect the health of our most sensitive individuals and environment; three, industrial and pollution abatement/control strategies that are environmentally sound, that preserve existing jobs and create new jobs, that protect the poor from rapid electric rate increases and ill health associated with acid rain, and that encourage energy conservation and renewable energy systems; four, adequate funding of the clean-up that will distribute costs fairly among corporations, governments, and consumers, taking specific steps to protect the poor; and, five, rigorous enforcement of clean air laws and regulations.

The individual policies of our church bodies closely parallel these recommendations of the Toronto statement. We believe that S. 2203 addresses many of the concerns we have raised. We strongly support the provisions of S. 2203 that call for mandatory negotiation of a North American treaty for the control of air pollution. The United States, Mexico, and Canada suffer collectively from each other's transboundary air pollution.

The proposals to require operating limits on the plants which pollute the most is consistent with our desire to greatly reduce acid rain-causing pollutants. We have some concern that the proposed operating reductions may not achieve the necessary reductions in pollution, but we support them as a good beginning.

Evidence suggests that oxides of nitrogen and ozone make significant contributions to both human and environmental health disruption. We support these provisions of the bill. We believe that further control of these pollutants are both technologically achievable and necessary.

Working against such a serious threat to creation as acid rain will require commitment, perseverance, energy, and faith. S. 2203 takes seriously our responsibility as stewards of the Earth.

Mr. Chairman, thank you for allowing me to testify before this committee today.

Senator **Burdick**. Thank you very much.

I was particularly impressed by your emphasis on the problem being one of the continent, not just the United States. Thank you again.

Ms. **Duba**. Thank you.

Senator **Burdick**. Our next witness is Richard Kamp, director, Smelter Crisis Education Project.

STATEMENT OF RICHARD KAMP, DIRECTOR, SMELTER CRISIS EDUCATION PROJECT

Mr. **Kamp**. Thank you, Senator Burdick. My name is Dick Kamp, and I am the director of the border ecology project, which includes the organization discussed. We are a nonprofit advocate for environmental solutions along the United States-Mexico border, and we have been working in Arizona and Sonora on problems of smelter pollution, toxics, and water issues. I am also a staff writer for the Wick chain of newspapers in southern Arizona on these same issues.

I would like to discuss three separate and interwoven issues here. The first is, in my county where I live, the endangerment to specific individuals from short-term peaks, high levels of sulfur dioxide; second, the status of water environmental agreements with Mexico, in particular relating to the giant Nacozari smelter, which opened in June; and finally adding language to strengthen this bill consistent with the 1977 Clean Air Act to bring smelters into compliance.

Historically, the sulfur dioxide health issue has been one of urban industrial inversions, and that was the basis for the 24-hour standard that was set. In more recent years, EPA's health criteria documents have focused very heavily on what they call short-term peaks of SO_2, often for only 3 minutes, that have caused—in the laboratory—life-endangering situations for asthmatics and other sensitive individuals.

My county has been, actually, one of those laboratories for many decades because of the presence of an uncontrolled giant smelter in

Douglas, run by Phelps Dodge, which recently, because of international pressure, because of evidence of health endangerment, and because of ambient air violations, entered into a consent decree to close in January of next year.

In the meantime, between the signing of this decree, which took place at the end of July, and next January, there were interim standards—not official standards, but levels for short-term exposures of SO_2 that were set for 6 minutes—to protect what regulatory agencies had now documented as known cases of asthma attacks being caused by SO_2 pollution. The level that was set by the State of Arizona and the EPA was two parts per million for 6 minutes, which is roughly five times higher than lab tests showed were affecting most asthmatics.

The Arizona State asthmatic study also included a very detailed monitoring program surrounding smelter emissions, including a monitor set up at the ranch of one rancher, an asthmatic living 12 miles from the smelter, a considerable distance, who had been suffering attacks consistently, that her physician and herself were correlating with smelter emissions.

In the middle of August, this particular woman, June Hewitt, reported a severe attack which she said accompanied a very heavy plume of smoke coming in and sitting on her ranch for a considerable period of time. In fact, the attack was so severe that she was taken to the hospital, given an injection of steroids, and was still not able to resume breathing.

The State almost immediately came down, the Arizona Department of Health Services, examined their monitoring data, and found that the level of SO_2 that had occurred at the exact same time that the attack was brought on was exactly two parts per million for 6 minutes, with two of these peaks occurring. These peaks had been accompanied in the legal actions taken to control Phelps Dodge with high fines. However, because the State and the EPA believed that it was physically impossible for this type of level to show up at a 12-mile distance from the stack, they had not included her monitor as part of the agreement.

At this time, both the EPA and ADHS have unequivocally agreed that her attack was tied in to those levels, and they also agree that there isn't any question that it's not a level that, at least in her particular case, is adequate to protect her health.

When I refer to these as life-endangering, I think it is obvious why. When you are an asthmatic and your bronchii constrict, if they constrict for long enough, your heart stops beating. June is a case where, if she did not have very, very heavy medication with heavy side effects available to her, she could—and her physician believes that she would—die. Very often, the solution has been for people like June Newitt in terms of medical advice has been: leave the area, period.

This monitoring in Arizona is far more comprehensive than anywhere else. There are very few cases of EPA having monitored the short-term SO_2 peaks in other States. And I think the main conclusion here is very simple: Whether it's S. 2203 or another piece of legislation, it is only the actual control of total emissions by SO_2 emitters that is going to stop this very real endangerment. We are not talking here about labs, we're talking about real people.

These asthmatics in Cochise County, among them June, were one of the bases of a seven-State suit against the EPA last year to establish new standards for SO_2, along with the prevention of acid rain.

The smelters in Mexico at Nacozari, Sonora, and Cananea, Sonora, are a major concern to the Southwest particularly the Nacozari plant because, at its capacity of 1,400 TPD, it has enormous potential impact as an emitter larger than any United States source. The smelter has had mechanical operating difficulties, and they have probably operated at about a quarter of that level since they opened in June.

On the positive side, there is a contractor to build controls for that plant, accompanying a verbal commitment by Mexico, but there has been no comprehensive agreement made with Mexico to establish controls at Nacozari or to guarantee the ultimate controls at the Cananea smelter. These smelters are very close to the border. Nacozari is about 50 miles south of Douglas. Cananea is about 15 miles south of the border and about 50 miles from Douglas also.

Also on the positive side there is construction that is beginning—actually today—on the acid plant.

The negative part of this is that there are no bills in the Senate—although I haven't read the latest bill that was introduced—that contain language equivalent to House bill 4567, which has very comprehensive provisions for drawing up an agreement with Mexico. I strongly encourage the Senate to add language to this bill and to your committee to include in S. 2203 the same language that exists in House bill 4567 for developing an international agreement to control the Mexican smelters.

The final issue is one that more or less repeats the 1977 Clean Air Act in requiring final compliance of copper smelters that were given an exemption until 1988 from compliance with the act. The main thrust of language that is contained in section 103 of H.R. 4567 is to ensure that any exemptions given to these smelters are enforceable, that smelters do not operate out of compliance without the exemptions, and that the exemptions end in 1988. This sounds like legal double talk, but it is requiring an enforceability to a provision that has turned out to be loose.

There is only one smelter at this point, the San Manuel smelter, that is intending to apply for an NSO. The main problem we have here is a tie-in to the Douglas smelter consent decree, which has become a part of our negotiations with Mexico. Phelps Dodge did state in that decree that if nonconsistent actions were taken by the EPA against any other smelters to provisions in the decree that was given to them, then they would seek to overturn the decree, which would also upset the negotiations with Mexico.

So, essentially, I am asking for the 1977 Clean Air Act provisions on smelters to be legally strengthened, not added to. This is not a new provision to be added.

I want to thank you very much for allowing me to testify basically in general support of S. 2203.

Senator BURDICK. Well, thank you for your testimony. You just made one omission.

Mr. KAMP. OK.

Senator **Burdick**. You didn't mention the plant at Sudbury.

Mr. **Kamp**. The plant at Sudbury isn't in the United States. Did I say North America? If I did, I was wrong. Sudbury is considerably bigger than Nacozari.

Senator **Burdick**. It underscores the nature of this, that it is a continental problem, not just a national problem.

Mr. **Kamp**. I have no disagreement about the comments you have made so far.

Senator **Burdick**. Pardon?

Mr. **Kamp**. I have no disagreement about the comments on Canadian control.

Senator **Burdick**. We have a continental question on our hands, and some of the relief for this problem is going to have to extend beyond the borders of this committee. It's an international question.

Mr. **Kamp**. Yes.

Senator **Burdick**. Mr. Chairman.

Senator **Stafford** [presiding]. Thank you very much, Senator Burdick.

I have no questions for the panel. I really appreciate your being here. I might say to Ms. Donovan that I do drive through Guilderland quite often on my way to Berne or Albany en route from Washington to Vermont, so I know that territory.

Ms. **Donovan**. Well, stop and say hello.

Senator **Stafford**. I will.

This brings us to our last panel, and may I say to this panel that I am very grateful, the full committee is, for your being here and helping us.

The last panel will be: John Quarles, who is chairman, National Environmental Development Association; and John Anderson, Electricity Consumers Resource Council, Washington, DC.

We welcome you here. Mr. Quarles, you are no stranger to this committee, or this room, as a matter of fact, and we would be pleased to hear your testimony and then that of Mr. Anderson.

STATEMENT OF JOHN QUARLES, CHAIRMAN, NATIONAL ENVIRONMENTAL DEVELOPMENT ASSOCIATION

Mr. **Quarles**. Thank you, Mr. Chairman, Senator Burdick, and others present. I appreciate the chance to testify this morning. I know that the hour is late, and the month is late also, and we look toward these hearings not with so much of an expectation of immediate development of legislation, but with the realization that the issues that are being discussed here are ones that the Congress will return to when the 100th Congress convenes next year. We commend you for holding these hearings and appreciate the chance to testify at them.

In view of the circumstances, it probably would not be productive for me to impose upon your time to try to go through issues at any great length, and I will therefore, in accordance with your request, be very brief in my oral comments. I have submitted a written statement.

Senator **Stafford**. We will place all of that in the record.

Mr. QUARLES. Thank you. The main point that NEDA CAAP would like to register is our conviction that when Congress legislates on the Clean Air Act, it is important to address the full range of issues that need to be raised and considered and acted on by the Congress in regard to the Clean Air Act.

Although we recognize that this hearing is really focused solely on acid rain, I would like to take a moment to comment on at least one other major issue that is present and needs to be addressed; that is, the basic nonattainment or ozone nonattainment problem. EPA currently anticipates that more than 70 metropolitan areas will be in nonattainment when the statutory deadline comes December 31, 1987, and more than half of those major metropolitan areas will be in such a severe stage of nonattainment that there is little realistic likelihood of their coming into attainment at any time in the near future or really in the foreseeable future.

What that means is that as the statute is now written, the construction moratorium presumably is triggered and severe distress could be occasioned if that occurs. More than that, the whole system for trying to achieve further reductions in air pollution emissions is stalled because no one can come up with a SIP provision that satisfies the legal requirements because the legal requirements command attainment by December 31, 1987, and that is a physical impossibility, at least as viewed in virtually everybody's eyes unless you are going to go back to 86 percent gasoline rationing or something that most people would regard as wholly unrealistic. So, this is a problem that Congress will need to address.

EPA currently is developing a strategy, but it is at least our conviction that that strategy cannot solve the problem. EPA really is supposed to obey the law, and the problem is in the law itself. We hope that you will put that on the agenda together with acid rain.

Insofar as S. 2203 is concerned, our primary concerns with that relate to the controls that will be imposed on industrial sources. Our view is that the industrial sources are, by and large, smaller and more scattered and the contribution that they make to the phenomenon known as acid rain is, in many instances, quite negligible. So that the cost effectiveness of extending controls to that category requires very careful consideration.

Finally, I would also note that if we go forward with a demanding program to reduce sulfur emissions, then the PSD requirements, at least insofar as they relate to sulfur oxides, make little or no sense, and we will be strongly urging the committee to consider a removal of those requirements in order to reduce the redtape that is associated with them under circumstances where there would be little benefit.

Thank you for allowing me to make these comments. That would conclude my testimony.

Senator STAFFORD. All right, sir. Thank you, Mr. Quarles.

Mr. Anderson, we would be glad to hear from you.

STATEMENT OF JOHN A. ANDERSON, ELECTRICITY CONSUMERS RESOURCE COUNCIL

Mr. ANDERSON. Thank you very much for the opportunity to be here, Mr. Chairman, and members of the committee. I am John

Anderson, executive director of the Electricity Consumers Resource Council. Elcon is an association of large industrial consumers of electricity, with facilities in most of the 50 States and in many foreign countries. Our members produce a wide range of products, including steel, aluminum, motor vehicles, chemicals, glass, industrial gases, food products, and textiles.

Elcon members consume approximately 10 percent of all electricity sold to industrial customers and nearly 5 percent of all electricity consumed in the United States. As such, we have a very large and continuing interest in the subject such as acid rain.

We are opposed to S. 2203 for a variety of reasons. First, acid rain legislation, any acid rain legislation, would be expensive, and estimates of the cost of S. 2203 are especially high. Indeed, if appears that S. 2203 would cost $10 to $15 billion, with rate increases very, very substantial. In fact, one study says that in one State, rate increases could exceed 100 percent.

The United States presently faces a relative price disadvantage for electricity with Canada and other industrialized nations. An expensive emission reduction program would increase this disadvantage. The costs, and therefore the rate impacts, of S. 2203 would fall primarily on a few States. The Congressional Budget Office [CBO] estimates that 10 States would be impacted. Another study, by Temple, Barker, and Sloane, says that 8 to 24 States would be particularly impacted.

The point we would like to emphasize, though, is that the rate impacts of this type of legislation would be disproportionate and, therefore, would cause economic dislocation. Many electricity-intensive industrial firms in the States most affected are already in poor financial health. This is particularly true for aluminum, steel, and chemical companies. This legislation would exacerbate their financial plight.

The additional costs would encourage electricity-intensive industrial firms to concentrate production in areas of the United States that are less affected, or in foreign countries. For example, Canadian utilities are attracting the primary metals industry through offers of rate reductions of as much as 66 percent. Acid rain legislation would increase the attractiveness of these offers as it increases U.S. electric rates relative to those in other industrialized nations.

Loss of basic industry means loss of jobs in the basic industry. However, it also means loss of fabrication jobs and operations, since economics often requires fabrication processes to be in close geographical proximity to the basic industry.

We also oppose S. 2203 because we do not believe that the costs have been shown to be justified. The link between the implementation of S. 2203 and an improvement in environmental quality has not been established, in our view. We will not argue the fact that what goes up must come down. We simply don't know that reducing SO_2 or NO_x emissions in certain locations will lower acidity in lakes or reduce tree damage.

Indeed, the forest industry, which perhaps has more at stake than any other industry in the United States, has seen no evidence of forest declines due to these particular emissions. Additionally an ineffective program—that is, one that produces uncertain results—may be worse than no program at all.

Emissions have declined and will continue to decline further without additional legislation, due to existing new source emission standards and increased implementation of new coal-burning technology.

We are concerned about the environment. We agree with the others that acid rain is a problem. We are also concerned, however, about the impact of the proposed legislation on U.S. industries. We believe that Congress must consider the effectiveness of any proposed legislation in achieving its goals. We therefore believe that: First, additional mandated emission control programs in the United States are not warranted, certainly not at this time;

Second, a cost-benefit analysis of the proposed legislation should be conducted prior to passage, to assure the required costs are justified;

Third, increased funding for clean coal technologies and demonstration projects should be considered;

Finally, research into all aspects of the acid rain phenomenon should continue, to define the issues accurately and identify cost-justified solutions.

Again, I thank you very much for the opportunity to be here, and we will submit a more complete written statement for the record in a very short length of time.

Senator STAFFORD. All right. We will place it in the record. I have no questions.

I do want to thank you both for joining us this morning. We have exposed most sides of this problem now, and I guess the committee will have to collectively take another look at what we want to do when we get back here in January, unless events cause us to stay here the rest of the fall—and the way things are going this morning in the Senate, that seems likely.

Senator Burdick.

Senator BURDICK. Are we going to sing Christmas carols here, do you think?

Senator STAFFORD. I beg your pardon?

Senator BURDICK. Are we going to sing Christmas carols?

Senator STAFFORD. I hope we do it at home, not here.

Well, thank you all.

If there are no further questions, the committee will stand adjourned.

[Whereupon, at 12:14 p.m., the committee was adjourned.]

[Statements submitted for the record follow:]

TESTIMONY OF JAMES N. GALLOWAY

Associate Professor, Environmental Sciences Department

University of Virginia, Charlottesville, VA

to the

Committee on Environment and Public Works

U. S. Senate, Washington, D. C.

Thursday, October 2, 1986

It is a pleasure to be here today to present information on the phenomena and impacts of acid deposition. The questions that scientists are most often asked about acid deposition can be classified into the following types:

Does it exist?

Is it caused by humans?

Where does it exist?

How bad is it?

Does it effect the environment?

How?

In preparing answers to these questions, I went to my files to examine past testimonies that I and my colleagues have presented to other committees and subcommittees of the US Congress on the subject of acid deposition. My first testimony occurred in 1976. Some of my colleagues testified in earlier years. In reviewing these past testimonies of others and myself, I found that these questions had been answered some time ago. The research that has been performed in the international scientific community over the past decade has not changed the original answers to these questions but rather has expanded on the first answers.

As an example of the scientific consensus of the issue of acid deposition let's examine some very specific questions on the issue of acid deposition and its effects:

1. What fractions of sulfur and nitrogen emissions and deposition in eastern North America are man-made? What are the most important types of man-made sources?
2. What is the characteristic lifetime and scale of transport for sulfur in the atmosphere?
3. What are the relative contributions of wet and dry processes to deposited sulfur and nitrogen?
4. How do wet deposition, dry deposition, total deposition, and precipitation acidity vary with changes in sulfur dioxide emissions?
5. Have lakes and streams in the United States been acidified by acid rain?
6. What are the estimates of the past, current and future rates of acidification?
7. Are the biological changes due to acidification of lakes and streams?
8. If sulfur emissions are reduced, how long will it take lakes and streams to return to their previous chemical and biological conditions?
9. Does acidic deposition alter forest ecosystems?
10. Does acidic deposition alter soils?
11. Does acidic deposition affect trees and plants directly?
12. Does acid deposition damage structures and monuments?
13. Do compounds of sulfur and nitrogen affect visibility?

Is there scientific consensus on these questions? To determine this, last year a group of scientists formed an _ad hoc_ committee to review six major scientific reports prepared by scientists and sponsored by the Executive Branch or the Congress. The review sought to assess the degree of scientific consensus on major chemical, physical, and biological issues relevant to increase acid-rain controls. The result of this consensus review is a document entitled "Is There Scientific Consensus on Acid

Rain". For the major scientific issues of acid rain, the document excerpts relevant sections from the reports.

The six scientific reports are:

- The Acidic Deposition Phenomenon and Its Effects: Critical Assessment Review Papers, Volumes I, II. USEPA Report EPA-600/8-83-016A, July 1984.
- Atmosphere-Biosphere Interactions: Toward a Better Understanding of the Ecological Consequences of Fossil Fuel Combustion, National Research Council, National Academy Press, 1981.
- Atmospheric Processes in Eastern North America; A review of Current Scientific Understanding, National Research Council, National Academy Press, 1983.
- Acid Deposition: Processes of Lake Acidification, National Research Council, National Academy Press, 1984.
- Report of the Acid Rain Peer Review Panel, Office of Science and Technology Policy, July 1984.
- Acid Rain and Transported Air Pollutants: Implications for Public Policy, Report OTA-0-204, Office of Technology Assessment, U.S. Congress, Washington, D. C. 20510, June 1984.

These sources range from the National Academy of Sciences, with the most rigorous review policy of any of our scientific organizations, to the Congressional OTA and White House OSTP. The White House OSTP panel was formulated to provide an "independent" review of a document concerning acid deposition and its effects written by delegations from the US and Canadian governments.

Collectively, the excerpts show that strong scientific consensus exists on these major issues, even though uncertainty remains and further research is warranted. Even in areas where these documents indicate that large uncertainties remain, i.e., the precise contribution of sulfur or nitrogen compounds to forest degradation, they show a general consensus, in this case that air pollution can stress forests. Lastly, the ad hoc committee believes that these governmental reports establish a scientific consensus that reducing the emissions of a large number of air pollutants, most notably sulfur dioxide, would benefit biological systems in North America significantly.

To enable the Committee on Environmental Public Works a careful and considered review of the scientific consensus on the acid deposition, I have appended a copy of the ad hoc committee report that lists questions and then provides quotes from each document that address the question. Let me stress, the ad hoc committee did not write the answers to the questions--it only compiled the answers and let the similarity of the answers establish that there is scientific consensus about acid deposition.

The document I have just referred to states that there is scientific consensus on a broad range of acid deposition-related issues. However this should not be taken to say that as scientists we have answered every question. There are still questions that remain to be answered; theories that remain to be proved. There are still advances being made in the area of acid deposition. However, these recent advances have not so much provided new theories, but rather have or are in the process of providing proof of existing theories.

For example, one of the more recent developments in the area of the impacts of acid deposition has been in the area of surface water acidification. The development I discuss below is not a new theory, but rather represents the proof of a theory postulated some time ago.

Since research on acid deposition and its effect on aquatic ecosystems began in the 1970's in the United States, it has been realized that there must be a fundamental difference between the northeast and southeast United States to account for the fact that although both areas receive about equivalent amounts of acid deposition and have surface waters that are as sensitive, regional scale acidification is only noted in the northeast. The theory put forward said that terrestrial ecosystems must, in some way, dampen or retard the impact of acid deposition on sensitive waters in the southeast. Further development of the theory suggested that the ability of southeastern soils to adsorb sulfate was the mechanism that protected southeastern surface waters from acidification. However, the same theory stated that acidification was only delayed, not prevented.

The influence of the impact of sulfate adsorption in the soil on surface water acidification is illustrated in Figure 1 for a region of low sulfate adsorption (northeastern United States) and moderate sulfate adsorption (southeastern United States). In this figure, the vertical arrows represent atmospheric deposition of sulfur (as sulfate); the horizontal arrows represent discharge of sulfate from the soils to the surface waters. The width of the arrow reflects the rate of deposition or discharge. The large box represents the soil reservoir; the dotted box within the large box represents the magnitude of the sulfate adsorption capacity of the soils. The smaller the box, the smaller the sulfate adsorption capacity. In the figure, note that the rate of sulfur deposition is the same for northeastern and southeastern United States. Also note that the soils in the northeastern United States have a much smaller sulfate adsorption capacity than the soils in the southeastern United States. This is due to the greater age and more highly weathered nature of the soils in the southeastern United States. If a sulfate reservoir in Figure 1 is filled, the soils are saturated with sulfate and inputs (atmospheric deposition) equal outputs (discharge to surface waters). This is illustrated by the northeastern United States where saturation of the sulfate adsorption capacity is caused by decades of past deposition. It is different in the southeastern United States. Although the amount of historical sulfur deposition has been essentially the same as the northeastern United States, the amount of sulfur discharged from the soils to the surface waters is substantially smaller than that deposited from the atmosphere because the southeastern soils have a much larger sulfate adsorption capacity. However, as is evident from the figure, as time progresses the sulfate capacity becomes saturated in the southeastern soils and the amount of atmospheric sulfate that is released to the streams increases as a function of time until at the end (10-30 years later), when the sulfate adsorption capacity is saturated, the inputs equal the outputs of sulfur.

Until recently, this phenomenon of delayed acidification had not been tested in the field, due to a lack of long enough temporal records on the sulfate concentrations in sensitive surface waters of the southeastern US. (primarily located in mountainous regions). However, a recent paper by Smith and Alexander of United States Geological Survey (USGS) has shown that some of the USGS benchmark streams in the southeast have been increasing their sulfate concentrations over the past two decade.

Even more recently, we at the University of Virginia have analyzed weekly samples of streams taken over the past six years from two watersheds in Shenandoah National Park (Deep Run and White Oak Run). We have found that one stream has experienced a significant increase in sulfate concentration and a concurrent pH decrease over the six years of measuring. After eliminating the variability in the data that could be caused by season-to-season or year-to-year differences in temperature, water flow and biological activity, we concluded that these increases in sulfate and decreases in pH of the stream are due to the release of atmospheric sulfur from the soil reservoir. We believe this represents field verification of the theory of delayed acidification.

Thus, it is not longer a question of "Will sensitive waters in the southeastern United States acidify?", but rather a question of "How many and how fast?". From the modeling work we have done at the University of Virginia, we believe that the phenomena of acidified surface waters in the southeast will be observed in increasing numbers over the next decade or two. The implication is that we now have regional acidification of surface waters in the northeastern United States with decreases in biological populations. In the next decade or two, we believe there is a potential for seeing the same impact in the southeastern United States on the sensitive mountainous streams.

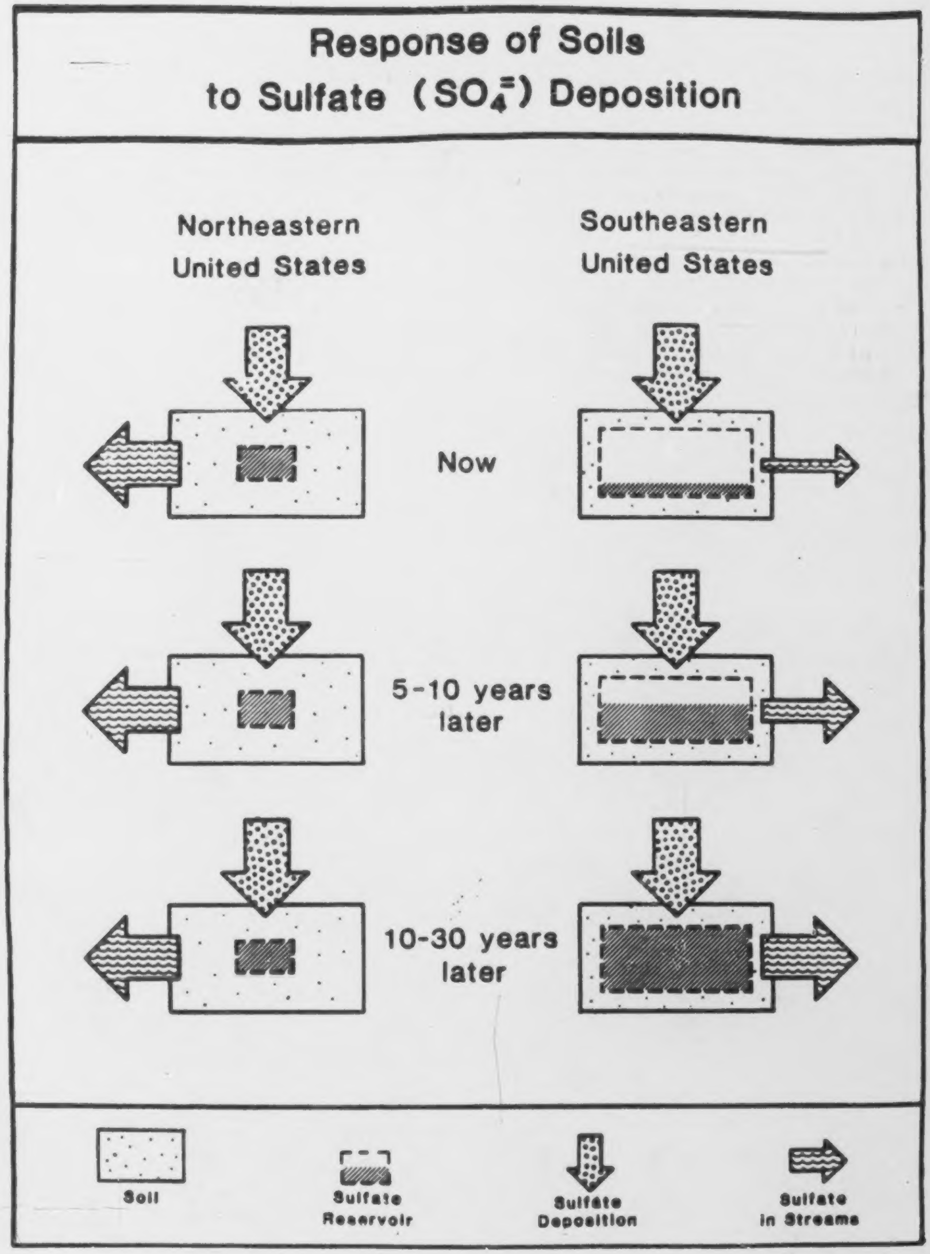
Response of Soils
to Sulfate ($SO_4^=$) Deposition
Northeastern United States
Southeastern United States
Now
5-10 years later
10-30 years later
Soil
Sulfate Reservoir
Sulfate Deposition
Sulfate in Streams

FIGURE 1

Testimony of Richard Kerch, Manager
Air Quality Activities

Consolidation Coal Company
1800 Washington Road
Pittsburgh, PA 15241

Before the

Senate Committee on Environment

and Public Works

Concerning

S. 2203

Washington, DC

October 2, 1986

My name is Richard L. Kerch. I am Manager of Air Quality Activities for Consolidation Coal Company, a subsidiary of Conoco and Du Pont. I appear here today on behalf of the Du Pont group of companies in opposition to S. 2203. In the short time allotted to me, I would like to make two points: (1) S. 2203 will not work; and (2) The costs to Du Pont companies of compliance with this bill are very large.

First, setting aside, for the purposes of this hearing, the question of whether there is a demonstrated need for the proposed legislation, this committee should insist that the proposals embodied in S. 2203 produce some measurable environmental improvement. They do not. None are stated in the purposes section of the bill nor are any given in the legislative language. This bill simply assumes, largely on a hope and a prayer, that some environmental good will befall the eastern U.S. All we know in advance, is that it will be very expensive to implement and it will result in reduced emissions of sulfur dioxide. The premise that reducing SO_2 emissions will improve the quality of precipitation or environmental quality in the northeast is seriously flawed. Scientists now have reason to believe that the atmosphere will behave in a strongly non-linear way. Reductions of 50 percent in sulfur dioxide concentrations in the ambient air of New England will yield reductions in wet deposited sulfate in New England of about 14 percent. We believe that the impact of northeastern (local) emissions have been underestimated by the authors of S. 2203, because many northeastern states making an emission contribution will not have to make a reduction contribution. This means ambient air concentrations will not be reduced in New England and New York by 50 percent. So even the 14 percent reduction that would be expected in wet sulfate deposition will not be realized. We know, as well, that this bill essentially ignores the significant role that other pollutants play in atmospheric chemistry. It also ignores the significant reductions already made in sulfur dioxide emissions over the past 13 years. Using sulfur dioxide emission reduction as a surrogate for raising the pH of rain or reducing the wet deposition of sulfate will prove a failure. Any other outcome would constitute a miracle.

Good public policy, it seems to me, should offer all Americans the expectation in return for the tremendous dollar cost, a high probability for success, that S. 2203 will work. I submit that it will not.

In addition to the ineffectiveness of the bill from an environmental viewpoint, the bill also will be enormously expensive for U.S. electric power consumers and industry. For example, Du Pont operates more than 100 boilers with heat inputs greater than 100 mm Btu/hr. Approximately 40 percent of these units will be over 35 years of age by 1991. Under Section 2(a) of S. 2203, these boilers will be subject to NSPS for SO_x and NO_x. We estimate that compliance costs in 1991 will be $140 million in capital expenditures and $40 million annually in increased operation and maintenance (in 1986 dollars). By the year 2005, new capital investment requirements under the bill will have grown to $225 million and operating and maintenance cost penalties will have increased to $60 million annually. This $225 million investment will only buy a 0.3 percent reduction in the SO_2 emission inventory ($2960/ton of SO_2 removed). In our view, this is an exorbitant cost.

The operating cost estimates referred to above do not include increases in electricity cost which will occur due to utility compliance with this bill. However, those costs are expected to be significant for Du Pont because we consume about 1/2 percent of all the electricity generated in the country.

The New Source Performance Standards (NSPS) trigger unfairly discriminates against those who have maintained equipment in top operating condition in an effort to achieve high levels of operating availability. Because the complexity of the new equipment will add significantly to the potential for breakdown, the new controls could threaten the overall reliability of steam supply--an item of paramount importance in processes where the cost of lost production is extremely high. This bill not only would result in extremely high investment and operating costs but would also result in unnecessary reductions in steam supply reliability for the sake of questionable environmental benefits.

Du Pont also estimate the costs to retrofit SO_2 controls to sulfuric acid processes will exceed $40 million. Applying new source requirements to old emission sources by statute is unwise. First, the technology which can be incorporated into the design of new facilities often cannot be retrofitted to older facilities. In fact, it may be practically impossible for older facilities to meet NSPS emission requirements, thus forcing the shutdown of those facilities. Second, the costs of retrofitting control technology are much higher than incorporating controls in new plant designs.

Section 2(b) also would add an additional requirement for existing emission sources. The requirement that any NO_x control technology demonstrated for existing sources in any of the 25 Organization for Economic Cooperation and Development (OECD) countries ignores practical differences which may exist among industries in different countries. There is no provision for economic reasonableness; merely the demonstration in any OECD country triggers the obligation for EPA to require similar action here. The "open-endedness" of this provision is troubling. It is impossible to foresee what manner of NO_x reductions might be demonstrated in another country or how that technology would work here.

Finally, Section 3(h) of the bill limiting sulfur in diesel fuel would lead to large new costs for Conoco's petroleum refining. Our analysis shows that Conoco would spend $126 million in capital and increase its operating costs by $15 million annually to build and operate the systems necessary to comply with the .05 weight percent sulfur cap in the bill. Costs will be higher if a lower value allowed under the bill were adopted.

Conoco produces about 3 percent of the diesel fuel in the U.S. Comparable costs for other refiners suggest that the national costs of this provision are in the billions. The consumer price of diesel fuel could increase by about five cents per gallon. Nationwide, Section 3(h) would result in the control of only 2 percent of the SO_2 in the atmosphere. Further, those reductions would be diffused homogeneously across the country rather than concentrated in areas potentially sensitive to acid rain.

Mr. Chairman, we oppose passage of the bill.

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Statement of

CHARLES B. HENDERSON
Senior Vice President, Research and Technology
Atlantic Research Corporation

On Behalf of the

CLEAN COAL COALITION, INC.

Before the

COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
UNITED STATES SENATE

on S.2203

The Proposed New Clean Air Act

October 2, 1986

Mr. Chairman. My name is Charles B. Henderson. I am Senior Vice President for Research and Technology of the Atlantic Research Corporation located in Alexandria, Virginia. I am appearing today as President of the Clean Coal Coalition, Inc., an organization of interested companies and organizations dedicated to the development of public policies which encouraged the use of flexible, leased cost air emission control strategies particularly for the reduction of acid rain.

The Coalition is comprised of companies representing a variety of view points drawn from the industrial user, electrical utility, gas utility, equipment manufacturing, coal processing, and engineering and consulting communities.

"ENCOURAGING INNOVATIVE TECHNOLOGIES TO BURN COAL CLEANLY"

We very much appreciate the opportunity to present our views on S.2203, the new proposed Clean Air Act and acid rain issues. We would like to complement you, Mr. Chairman, and this Committee for its leadership in addressing acid deposition in the United States and for your willingness to consider a flexible approach to solving this important environmental problem.

The Coalition urges the enactment of federal acid rain legislation, which recognizes that there are cost- effective control methods, in addition to flue gas desulfurization. Scrubbers are but one of many options for controlling sulfur dioxide emissions. Federal statutory requirements should not dictate, or operate to dictate, flue gas scrubbing as the only or favored emission control technique.

Accordingly, the Coalition recommends three approaches for the Committee's consideration:

1. Acid rain legislation should maintain flexibility for achieving emission reduction targets, including the blending of options.

Among such options, in addition to flue gas desulfurization, is coal cleaning and improved combustion technologies. Pre-combustion coal cleaning currently available can result in a significant removal of sulfur from coal in which a high fraction of the sulfur is pyritic in nature, particularly for coal mined in Northern Appalachia. This is particularly fortunate since this region is upwind from the northeast where acid rain is most extensive.

Coal cleaning has not received high recognition, heretofore, because the emphasis on the acid rain debate has been on percentage reductions in sulfur dioxide emissions and on use of the best control methods.

However, physical coal cleaning has been demonstrated as an effective method for removing sulfur, especially pyritic sulfur, and can be useful to achieve initial, interim emission requirements.

Three important points favor flexibility in federal policy to allow the use of coal cleaning in achieving initial or interim emission requirements:

First, coal cleaning available now is the universal clean coal retrofit technology which can be applied to all coal-burning facilities, large and small, old and new, as well as planned. Favorable results can be realized in the near-term with older facilities, about which some owners argue little progress can be made.

Second, coal cleaning technology is the most cost-effective and cost-beneficial control method in terms of amount of sulfur removed. This has been recognized by an Environmental Protection Agency report as long ago as 1981 which stated that: "Physical coal cleaning is the least-cost method of reducing sulfur emissions from the combustion of coal."

These points are elaborated in an invited, survey paper presented recently to the Third Pittsburgh Coal Conference by Dr. Leon Green, Jr., Vice President of the Coalition. A copy of Dr. Green's paper is attached to this statement for inclusion in the record. *

Third, coal cleaning is environmentally more beneficial than scrubbing when secondary factors are considered. Scrubbers are complex chemical plants that are known to be susceptible to failure. They create large amounts of sludge, the disposal of which has not been effectively evaluated. Needless to say, these problems have far-reaching implications under hazardous waste disposal requirements and resource recovery objectives.

2. Acid rain legislation should accelerate wider use of coal cleaning and combustion technologies.

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*Retained in committee files.

Since coal cleaning and combustion technologies are universally applicable, cost effective, and environmentally beneficial, acid rain legislation should encourage their further development and use.

This objective was thought to be one objective of the Clean Coal Technology Program as conceived by the Congress. As presently implemented, however, none of CCT projects selected to date would further develop precombustion coal cleaning, which is the logical first step to controlling sulfur dioxide emissions. This is not meant to be a criticism of those projects selected. It may mean that the other factors or constraints rendered the selection of coal cleaning projects impossible.

The fact remains that the full potential of coal cleaning technologies is not now being addressed. This opinion is apparently shared by others. We are pleased that the pending House and Senate FY '87 Interior Appropriations bill includes an additional $350 million to support a second round of projects to address "retrofit technologies."

In the meantime, this Committee should consider methods to further encourage development and implementation of coal cleaning and combustion technologies, especially if a second round does not materialize or if such technologies are not adequately addressed by DOE in the selection process.

3. Acid rain legislation should accelerate the development of innovative coal cleaning and combustion technologies to address long-term control requirements.

Long-term acid rain control requirements should permit the use of innovative coal cleaning technologies which are cost effective and environmentally sound. It should encourage the further use of advanced physical coal cleaning and methods for removing organic sulfur, which known physical methods cannot attack.

Microbial coal cleaning, now in the research and development stage, offer great potential for removing organic sulfur from coal found in widely divergent sources throughout the United States.

My own company, Atlantic Research Corporation, has pioneered the development of microbial coal cleaning methods. We have developed a microorganism designated CB1 which utilizes sulfur but not carbon.

CB1 acts mainly by the oxidation of thiophenic sulfur and perhaps other organic sulfur. Coal must be ground finely in order to make the process most effective.

Research is also examining large, commercial scale applications and their economics.

Initial data indicates that up to 47% of thiophenic sulfur can be removed by CB1 and that the process can be cost-effective.

Research and development needs to continue on new organisms that will remove other forms of organic sulfur present in most coal. We are now testing new microbes for attacking a range of sulfur compounds formed in coal. We are confident that the national acid rain control program would benefit from an acceleration of this research and the launching of commercial demonstration projects in the near future.

A further report on this subject published in the proceedings from the Tenth International Conference on Slurry Technology is attached to this statement for inclusion in the record.*

This completes the Coalition's statement. Thank you for the opportunity to appear before you today. I would be happy to respond to your questions, now and in further written submissions.

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*Retained in committee files.

TESTIMONY OF JAMES C. WILSON
PRESIDENT, ROCKY MOUNTAIN ENERGY COMPANY
BEFORE THE
SENATE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
WASHINGTON, D.C.
OCTOBER 2, 1986

Mr. Chairman and Members of the Committee:

My name is James C. Wilson. I am President and Chief Executive Officer of Rocky Mountain Energy Company. Rocky Mountain Energy is the mining subsidiary of Union Pacific Corporation. Our company is headquartered in Denver. We mine low-sulfur coal in Wyoming and high-sulfur coal in Missouri so we understand the effects of acid rain legislation on the entire coal industry.

I appreciate the opportunity to testify here today on S. 2203. Rocky Mountain Energy was one of the first, and it remains one of the very few members of the business community, to openly and actively support acid rain control legislation.

We support acid rain legislation because we believe enactment is inevitable and there is no good reason to delay further reductions of sulfur dioxide emissions that are thought to cause acid rain. While the scientific evidence certainly isn't conclusive, the National Academy of Sciences, congressional and other research organizations, and even the Administration through its Special Envoy, all agree that acid rain is a serious environmental threat. They also agree that emissions of SO_2 are one of the causes of acid rain. We can begin to reduce SO_2 emissions today with cost-effective techniques that are available now without further delay.

I want to emphasize, however, that our support of specific acid rain legislation is conditioned on two important public policy criteria. First, we feel very strongly that any new emissions reduction program must be cost-effective. Cost-effective legislation allows those who know best, local utility managers, freedom to choose from the widest range of pollution control options...and there are many options available today, including coal washing, blending fuels, fuel switching and "wet" and "dry" scrubbers.

Acid rain control legislation also should not discourage the development of new, even more cost-effective control technologies. Yet, legislation will discourage development of new technologies if it substitutes Washington decisions for economics and the market place in determining the choice of control options.

Second, the polluter should pay the costs of reducing its emissions. That's the traditional way environmental controls have been handled in the United States. That's the fair way and also the best way to keep compliance costs down.

For over four years, Rocky Mountain Energy has supported acid rain control bills that meet these two criteria. In the House we have supported H.R. 2679, the Udall/Cheney bill. In the Senate we were among the very first to support Senator Stafford's and Senator Mitchell's original acid rain bill and we still support it in its present form as S. 2200. We supported the acid rain program reported out of this Committee by overwhelming votes in each of the last two Congresses. We also support S. 2813 introduced three weeks ago by Senators Proxmire, Humphrey, Simpson, Burdick, and others particularly since it represents nearly the ideal cost-effective, polluter pays, freedom of choice legislation.

We have worked hard over the past four years, and so have you and many others in Congress, industry and the environmental community. We've worked together to try to move acid rain legislation to a common ground we all could support.

Unfortunately, S. 2203 takes the entire acid rain debate a giant step backward, away from the consensus the Committee had previously achieved and back toward deadlock. Frankly, and with all respect Mr. Chairman, we were astonished when you introduced this bill in April. It seemed to send a message to us and others in the business community that you had set aside the long held consensus of this Committee in favor of cost-effective legislation.

We must oppose S. 2203 because it is not cost-effective. According to the Office of Technology Assessment, it is the most costly and least efficient acid rain bill that has yet been introduced in Congress. We also oppose it because it is not a "freedom of choice" bill. S. 2203 is a "forced scrubbing" bill. There is today only one way to meet the SO_2 emission requirements in the bill and that's with flue gas desulfurization units.... scrubbers. S. 2203 will effectively prohibit all other compliance strategies.

To elaborate, S. 2203 will impose two requirements on old, coal-fired power plants built before 1971. First, S. 2203 says that, as soon as a power plant turns 35 years old, it must meet the same SO_2 requirements as new power plants including the pernicious "percentage reduction" requirement which was added to the Clean Air Act in 1977. The "percentage reduction" requirement says that new power plants must reduce SO_2 emissions between 70 and 90%, no matter how little sulfur is in the coal they burn, and no matter how little SO_2 the power plant would otherwise emit.

Some members of this Committee will remember that the "percentage reduction" requirement was added to the Clean Air Act in 1977 to protect high-sulfur coal markets and to prevent new power plants from using low-sulfur coal to reduce SO_2 emissions. Since all new plants have to reduce SO_2 emissions by a percentage, the "percentage reduction" requirement effectively requires all new plants to use scrubbers. S. 2203 will now extend the "percentage reduction" requirement so that it applies to old power plants as well as new ones.

Almost all pre-1970 power plants will be 35 years old around the turn of the century. So, by the year 2000, S. 2203 will effectively outlaw the use of coal-washing, fuel blending and fuel-switching as ways of reducing SO_2 emissions. It will also outlaw all new clean coal technologies developed in the meantime that are incapable of reducing SO_2 emissions by 90%. That would be a real environmental setback, because many of the most promising new technologies now under development are not expected to achieve a 90% level of SO_2 reduction efficiency on a consistent basis.

There is a second SO_2 reduction requirement in S. 2203 that kicks in in 1991. It says that all old coal-fired power plants that are not yet 35 years old must meet an emission limit of 0.7 lbs. SO_2/MM BTUs. This interim requirement will apply to old power plants until they turn 35.

It is claimed that this 0.7 lb. standard would benefit the low-sulfur coal industry because it would allow some utilities to switch to low-sulfur coal until they reach age 35. That is simply not the case; in fact, S. 2203 will have exactly the opposite effect on the low-sulfur coal industry.

If the bill means what it says, that no plant can ever exceed an emission limit of 0.7 lbs. SO_2/MM BTUs, then I can tell you there is not enough economically mineable coal in the entire U.S. that can meet such a standard.

Coal contract and supply data filed by utilities with the Federal Energy Regulatory Commission for 1984, 1985, and 1986 show that very little coal being mined today could meet the strict 0.7 lb. emission standard in S. 2203. In fact, based on a survey of 4,900 mines in the U.S., our geologists tell us that only four mines consistently produced coal in 1985 that could meet the standard.* Together, these four mines produced just over 10 million tons of coal in 1985. With increased demand, production of such coals could possibly be tripled by 1991. But even 30 million tons will not amount to much in the billion ton 1991 utility coal market.

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* Antelope, NERCO, Wyoming; North Antelope, Peabody, Wyoming; Spring Creek, NERCO, Montana; SUFCO, Coastal, Utah.

Worse, S. 2203 will cost the American consumer more per pound of SO_2 than any other acid rain bill.

One way to dramatize just how costly S. 2203 will be is to compare it to the penalty provisions found in most other acid rain bills. Some acid rain bills impose an automatic standard if states don't voluntarily meet the SO_2 reduction requirements. The penalty requires every power plant in a defaulting state to meet a 1.2 lbs. SO_2/MM BTUs standard. The penalty provision is designed to encourage voluntary compliance, because it's about three times as costly as a voluntary, least-cost compliance strategy.

The point is that the 0.7 lbs. standard in S. 2203 is about twice as stringent as the penalty provisions in other bills, provisions which are designed to be punitive. Thus, we can draw no other conclusion than that S. 2203 is designed to go beyond being merely punitive. For no apparent reason, S. 2203 inflicts an extraordinary cost penalty on the American customer.

It's also easy to see that S. 2203 is coal market protection legislation pure and simple. By relying exclusively on scrubbers, it is engineered to phase-out and ultimately prohibit the use of low-sulfur coal as the most reliable and the least costly means of reducing SO_2 emissions.

S. 2203 will not help the cause of acid rain legislation. It will surely drive away many friends and supporters which this Committee has developed under your leadership. It will arm the opponents of acid rain controls with new and convincing arguments against legislation. Finally, S. 2203 will erode the Committee's progress toward building a legislative consensus on acid rain legislation.

I would conclude by urging the Committee in the strongest way to drop S. 2203. Return to and build on the cost-effective approach the Committee has pursued in the past as embodied now in S. 2200 and particularly in S. 2813.

Thank you, Mr. Chairman, for the chance to share our views with the Committee. I would be pleased to answer any questions.

ROCKY MOUNTAIN ENERGY

A Subsidiary of
Union Pacific Corporation

November 4, 1986

The Honorable Gordon J. Humphrey
United States Senate
531 Hart Senate Office Building
Washington, DC 20510

Dear Senator Humphrey:

This letter responds to your questions concerning my testimony October 2, 1986, before the Environment and Public Works Committee concerning acid rain legislation. Before answering the questions directly, I feel it would be useful to address more completely the problems associated with large data bases for coal, and, in turn, provide some understanding of why the Committee has received such divergent testimony on the availability of very-low sulfur coal.

The only widely used data base of both coal reserves and coal quality estimation, which is publically available, is one prepared in the early 1970's by the Bureau of Mines (BOM) as a rough inventory of U.S. reserves. In that effort, the BOM utilized public and available private information to calculate coal reserves on a county-by-county basis across the entire United States. BOM tallied reserves within each county on the basis of sulfur content, however, the quality and extent of information on sulfur content was extremely variable. The available data were good in some parts of the country but almost totally lacking in others. These shortcomings in the BOM coal data base persist today and, if unaccounted for, result in misleading conclusions as to availability of coal by sulfur content.

In 1980, the consulting firm ICF, Inc. performed a study for the Electric Power Research Institute (EPRI) to ascertain the reliability of the BOM data at certain locations. ICF found, for example, that the BOM had identified a 20 billion ton reserve in Campbell County, Wyoming, but had relied on only 31 test drill holes to develop the coal quality information in a county with an area of three million acres. By today's industry

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standards, tens of thousands of holes would probably be drilled to arrive at a reliable quality estimate for a similar volume of coal. According to ICF, many coal seams included in the data base as reserves had no quality data at all. Even more revealing is the fact that the most up-to-date data publicly available to the BOM study was last gathered in 1929, before there was any concern whether or not 0.7 pounds per million Btu coal existed. Coal is an extremely heterogeneous substance that is typified by significant quality variations over short distances. Projections of large reserves of very-low sulfur coal in the western states, therefore, ignore some very fundamental precepts of geologic reasoning and mining economics.

S. 2203 sets an emission rate limitation of 0.7 pounds SO_2 per million Btu burned. In order to calculate the SO_2 emission rate both the sulfur content and the heating value of the coal deposit must be known. The BOM estimates, unfortunately, do not present data on the heating or Btu value of the coal, but only on its sulfur content. Therefore, in order to calculate SO_2 emission rates using the BOM data base, as was done by at least one witness, a host of questionable and very debatable assumptions must be applied. Such assumptions are fraught with uncertainty because of the way the date base was constructed.

Without precise knowledge of reserve ownership, mineability and quality information, a coal reserve should not be assumed to be available. In effect, it is "projected" and not really "identified" as available. Knowledge of the limitations of the BOM reserve base and its original purpose raises serious questions about the credibility of any estimates touting large reserves of very-low sulfur coal.

A more realistic way of looking at the issue is to review actual shipments of coal over a multi-year period. It is glaringly apparent that only a small number of mines can routinely ship coal capable of meeting the 0.7 limitation of S. 2203. Because only a small number of reserves may be very-low sulfur reserves, S. 2203 would then logically require that all other coal reserves across the United States be scrubbed in order to be utilized. The small, known reserves of very-low sulfur coal cannot play a significant role as some have testified because there simply is not enough available to meet the likely demand.

With that preface, following herewith are specific answers to your questions. If I can provide further explanation or detail, please feel free to contact me. As you know from our testimony, RME has supported the Committee's previous efforts to solve the problem of acid deposition.

Question 1: "You stated that 7 billion tons, roughly a nine year supply, of low-sulfur coal which could meet the 0.7 pounds per million Btu standard cited in S. 2203 is currently available in coal reserves. Given the lead-time for opening and operating a mine and the time necessary to acquire a federal lease, when would you estimate that this coal will be available?"

Answer 1: My estimate was arrived at by examining the issue in a number of ways. In addition to analysis of the BOM data base as revised over the years by DOE, we look at current shipment data and other reserve data available to us from our activity in the coal business. However, because of the way such coal quality data is reported, it is not possible to identify all of the coal in an absolute sense. To do so would be mere speculation; some of it will never be available. However, the essence of your question can be answered in another way.

Nearly all coal in the West is federally owned or federally controlled (because of surrounding federal ownership). Federal coal leasing has not been resumed since the moratorium created by controversy surrounding 1982 lease sales. It is unlikely that there will be any lease sale until 1988 or later. That would leave only three years to permit and construct a new mine, which today is generally accepted as insufficient time since permitting alone can take three years for a large western coal mine. It would seem logical to conclude, therefore, that only coal from currently operating mines would be available by 1991. It is also possible, but I believe extremely unlikely, that some already leased land which contains very-low sulfur coal could be brought into production by 1991.

Question 2: "Do you believe that all 7 billion tons of low-sulfur coal in our gross reserve are economically recoverable?"

Answer 2: It is highly unlikely that all of the 7 billion tons would be economically recoverable. Statistically, it is almost a certainty that some of that coal, if it could be specifically identified, will be in areas unsuitable for mining, i.e., alluvial valley floors. Some of the coal will be too distant from existing transportation to be economically available within a reasonable time frame and some will be in deposits too small to be economically segregated. In my opinion, it is unlikely that more than half of the tons would be economically recoverable within a reasonable time frame.

Question 3:	"How much low-sulfur coal which would meet the 0.7 pounds of sulfur dioxide million Btu standard would you estimate will be available by 1991?"
Answer 3:	As the response to Question 1 notes, coal not currently under lease and in production will not be available by 1991. Therefore, one has to look at existing mines which have demonstrated the capability to deliver coal of that quality. As the RME testimony of October 2, 1986 indicated, we have been able to identify only four mines which, using publicly available data filed by utilities with the Federal Energy Regulatory Commission, have been able to meet such a sulfur level on a consistent, shipment-by-shipment basis. At least two of these mines are in areas where other adjacent mines have not been able to meet the same standard; therefore, it is possible that these two mines might not be able to consistently meet the standard over the life of their reserves. The current production level of the four mines is about 10 million tons per year. They are believed to be currently capable of production at about twice that level if additional markets could be found. Three of them could probably expand beyond current capabilities. A reasonable estimate of their overall capacity might be 60 million tons per year if all of the reserves at the mine can meet that quality level. Obviously that level, which most likely could be achieved by 1991 would be insignificant compared to the demand level. That is why I believe most, in fact nearly all, of the utilities will be forced to install scrubbers.
Question 4:	"Due to rail rates and other factors which affect the cost of coal, which states do you believe would have the option to burn this low-sulfur coal? In other words, would it be economically feasible for states in the Mid-west and the East to burn coal from western reserves?"
Answer 4:	Based on my review of the situation there appears to be no good reason to believe the geographic area served by very-low sulfur coal would be materially different than the area served by low-sulfur

> western coal today. The answer will be determined by the interaction of buyers and sellers and cannot be predicted with any real confidence. In general, the coal will move into those plants where its low sulfur benefit would be maximized.

Because of S. 2203's stringent 0.7 limitation, the unavailability of coal to meet that standard and its extension of the percentage reduction requirement to all plants, midwestern utilities will be forced to install scrubbers and use midwestern and eastern coal. It means, in the first instance, that the opportunity to compete for future low-sulfur markets will never develop; and, in the second instance, that even existing markets will be lost. S. 2203 is a well-disguised piece of coal market protection legislation coming and going. It also happens to be the most expensive acid rain proposal to date.

Sincerely,

James W. Shaw

James W. Shaw
General Manager
Coal Development

JWS/lsc

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STATEMENT ON S.2203 - THE NEW CLEAN AIR ACT
SENATE ENVIRONMENT AND PUBLIC WORKS COMMITTEE
OCTOBER 2, 1986, WASHINGTON, DC

My name is Hope Donovan, and I am representing the Adirondack Mountain Club, or ADK, as it is called. This non-profit membership organization started in 1922 as a result of a meeting in a log cabin perched on top of Abercrombie and Fitch in New York City. Franklin D. Roosevelt was a charter member of ADK. The club has about 12,000 members, in 28 chapters, in three states. It is dedicated to broadening understanding, appreciation, and support of the New York State Forest Preserve through education programs and publications; to providing opportunities for environmentally responsible outdoor recreation; and to furthering sound conservation policies.

We commend the chairman and members of this committee for holding these public hearings and giving us an opportunity to support S. 2203. We endorse this bill that would reduce sulfur and nitrogen oxide emissions, and increase controls on mobile sources. We believe this bill, when enacted, will resolve many problems plaguing our beloved Adirondacks.

New York State last year celebrated the one-hundredth anniversary of the creation of its Forest Preserves. In the nineteenth century the Adirondacks had been exploited, and most of the once pristine wilderness areas had been logged and burned, and several animal species had been hunted to extinction. Thanks to the foresight of some of our earlier citizens today this spectacular area is largely restored, and now it serves as watershed, playground, and as ecologic and scenic reserves. The people of New York State have invested heavily to acquire and care for these lands, recognizing their importance to people throughout the state and nation. These splendid mountains, magnificant forests, and remote lakes and ponds are within a day's driving distance of 60 million Americans. They provide physical and mental respite from urban crowding, noise and pollution. At six million acres, the Adirondack Park is the largest area of wilderness in the East. In setting these acres aside for future generations, the people of New York State confidently planned to preserve a large area of unspoiled natural resources. They could not have foreseen that pollution originating from beyond our borders would threaten and in many cases destroy much of it.

People who in their youth enjoyed fishing many of the high lakes do not take their grandchildren back, because first the amphibians, then the fish, and then of course, the animals dependent on fish, including the loons that symbolize "wilderness" to those of us fortunate enough to know them -- all have disappeared in many of these waters. Forests that marched across peak after peak in green splendor are now brown, sick, and dying.

In the mid-1970s New Yorkers knew we had an acid rain problem, and we have been trying ever since to convince those areas largely responsible to stop polluting our air. We, in this state, have gone a long way towards cleaning our own. Between 1970 and 1980 we reduced our sulfur dioxide emissions 32.1 percent. In 1984, in the absence of federal action, New York passed legislation that will further reduce our sulfur and nitrogen emissions to comply with the expected federal legislation. This is the first specific acid rain control program in this country. We went ahead with this program knowing that at a maximum only 17 percent of the wet sulfates deposited in the Adirondack Mountains originate within our borders. We went ahead with this program knowing that our New York electric bills are far higher than in those states that are causing our problem. Both EPA and Clean Air Coalition analyses showed that with recommended controls midwesterners would still pay only about 75 percent as much for electricity as those in the New England and mid-Atlantic states.

In April, 1986, Lou Harris polled 1,254 adults nationwide and found that 79 percent thought acid rain was a serious problem, and 73 percent thought that shareowners of investor-owned utilitites should pay for cleanup. This poll also showed that a candidate's stand on environmental issues influenced voters significantly. I am enclosing a copy of the results of this poll.

Again and again we hear that there is no scientific certainty that sulfur and nitrogen oxide emissions from electric generating and other facilities and from mobile sources are the cause of our problems in lakes and forests, as well as streams and farmlands. There are very few things in this world that we can be certain about -- death and taxes are the only traditional certainties. There is, however, strong scientific consensus "...on the sequence of physical and chemical steps that lead from emission of oxides of sulfur and nitrogen in North America to eventual changes in widespread ecosystems." I am submitting a few copies of a report[1] of a group of scientists who compiled findings of six governmental studies of the last few years. This report shows astonishing agreement on the causes and sources of our woes.

We also hear that cleanup of acid causing pollution will cost too much. How much will the damages cost if they are unchecked? What is the worth of a forest? of a lake or pond full of fish? And then there are health costs, and building costs, and damage to all kinds of plants not just forests. How much would it cost to undo the damage when acid rain has drastically changed the chemistry of much of our land? Costs of controls when projected by utility groups are two or three times as high as those projected by government studies, such as that by the United States Office of Technology. Pollution abatement control -- manufacture, installation, and operation -- has a positive economic effect rarely mentioned. In an editorial[2] a few months ago the author estimates, "...that even a small-scale program of acid rain abatement will create 115,000 jobs and generate $1.5 billion in corporate profits." He goes on to say that these benefits will flow largely to the states now fighting acid rain legislaion.

Is it fair that New York suffers from pollution over which we have no control? Would you sit back and let your next-door neighbor dump his garbage in your yard because he claimed he could not afford to pay a proper disposal fee? Uncontrolled air pollution affects not only our Adirondacks, but there is evidence of serious damage to other parts of the country, too. Our relations with Canada and Mexico are at risk as well, and we are pleased that S. 2203 will address the international aspects of acid rain.

We know the problem; we know the solution; we must do something now before more lands and bodies of water are damaged or destroyed and will no longer support the life they now do. The USEPA has so far resisted New York State's court actions to force it to fully implement the 1977 Clean Air Act Amendments dealing with long range, interstate air pollution and acid rain. Congress must take a strong stand and act now to protect the health and welfare of not only New York State but of other areas of our country as well.

The Adirondack Mountain Club thanks you for the opportunity to offer these comments.

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[1] Is There Scientific Consensus on Acid Rain? Excerpts from Six Governmental Reports. Ad Hoc Committee on Acid Rain: Science and Policy. October 1985. The Institute of Ecosystem Studies, The New York Botanical Garden, Mary Flagler Cary Arboretum, Box AB, Millbrook, NY 12545.

[2] COOK, ALVIN A. JR. "Environmental Protection: Over the Past Two Decades this Business Has Grown into a Giant Industry." Environmental Science and Technology: American Chemical Society. XX:6.

The Harris Survey

For Release: Monday AM, May 19, 1986

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ENVIRONMENTAL ISSUES COULD BECOME A FACTOR IN CONGRESSIONAL RACES

By Louis Harris

Despite the relatively low-key attention paid to environmental problems such as acid rain and toxic waste dumps, the American people are nearly unanimous in their feeling that contamination problems are getting more serious and their impatience is now beginning to show. This is according to the Harris Survey conducted by telephone between April 5th and 8th, among a national cross section of 1,254 adults.

Indeed, in the upcoming off-year elections, one of the real sleeper issues may well be that of environmental controls. Here is how the issue might work, for example, in the case of toxic and hazardous wastes:

-- A big 93-6 percent majority of the public nationwide believes that "pollution of lakes and rivers by toxic substances from factories" is a serious problem. An almost as high 92-6 percent majority feels the same about "disposal of hazardous wastes." Obviously, nearly everyone in the country is worried about how to clean up toxic waste dumps.

-- By 67-29 percent, another substantial majority favors passage of the $10 billion extension of the super-fund hazardous waste clean up program for the next five years. Congress has delayed passage and has just barely extended the program a few months at a time. Clearly, the public is getting impatient and upset at the lack of decisive action by Congress on the clean-up of hazardous wastes.

Finally, when the public was asked what would happen if a candidate running for Congress in their district were to take a position on an environmental issue which they disagreed on, 16 percent said they would "certainly not vote for that candidate." This means that the environmental issue alone could affect as much as one vote out of every six. But when this overall indication is divided into those who are pro-environmentalist and those who are anti-environmentalist, a decisive and critical balance emerges. While the anti-environmental vote could muster 6 percent of the electorate to vote against a pro-environmental candidate, a much higher 10 percent of the electorate say they would certainly vote against an anti-environmentalist candidate.

Thus, the pro-environmental forces have a net four point balance in their favor. This may seem to be a small number of voters, but a swing of four points could easily mean the difference between Democratic or Republican control of the U.S. Senate this year. It could also account for the difference between a five or 10 seat pick-up for the Republicans, which might give Republicans and southern Democrats working control of the House. Or it could mean a net gain of 10 or 12 seats for the Democrats which could give the northern wing of that party solid control over the House.

The temper of the public is to be critical of business and the way it has handled environmental matters, as well as to be critical of the Republicans. For example, when asked which party they felt could do a better job of protecting the environment, the Democrats come out on top of the GOP by a substantial 49-32 percent margin.

But the mandate about business and the environment in many ways is more serious:

-- When asked who should pay for an injury to a person living near a landfill, and when it cannot be determined that the injury was caused by wastes from a specific company, a big 58 percent feel that the companies using the landfill should pay and another 31 percent feel that the industry producing the waste should pay. By comparison, no more that 5 percent think the government should compensate the victim of such injuries.

(over)

-- A substantial 79-17 percent majority of the public is convinced that "pollution from acid rain" is a serious problem. A big 73-23 percent majority of the public is convinced that a substantial part of the costs required to clean up acid rain should be borne by "the shareowners of investor-owned electric utilities." This contrasts with a much lower 51-45 percent majority who feels that such costs should be borne by "electricity consumers nationally" and the narrow 49-46 percent plurality who feel those costs should be paid by "electricity consumers in eastern and southern states where most coal and oil is burned."

There are those in politics who feel that the environmental issue has cooled appreciably over the past few years. This evidence would not indicate that. To the contrary, it would suggest that big majorities of the American people are deeply upset at what they feel is the lack of progress on cleaning up toxic waste dumps and acid rain. And, it could well be that in 1986, they mean to do something about it at the polls.

TABLES

Between April 5th and 8th, the Harris Survey asked a nationwide cross section of 1,254 adults by telephone:

"I'm going to read you some different kinds of environmental problems. For each, would you please tell me if it is currently a very serious problem, a somewhat serious problem, only a small problem, or no problem at all in this country?"

SERIOUSNESS OF ENVIRONMENTAL PROBLEMS

	Very Serious %	Somewhat Serious %	Only a Small Problem %	No Problem At All %	Not Sure %
Disposal of hazardous wastes	68	24	5	1	2
Pollution of lakes and rivers by toxic substances from factories	65	28	5	1	1
Contaminated drinking water	55	31	11	2	1
Pollution by radioactive wastes from nuclear power plants	49	30	15	4	2
Pollution from acid rain	42	37	13	4	4
Air pollution by coal-burning electric power plants	30	45	18	4	3

"Although experts disagree on the environmental impact of rainfall with high acid levels, most agree that acid rain is caused by sulfur emissions from electric utility plants that burn coal and oil and by nitrogen oxide emissions from cars and trucks. If Congress passed a law that required (READ EACH ITEM) to shoulder the substantial costs of cleaning up acid rain, would you consider such a law fair or unfair?"

ACID RAIN CLEAN-UP -- WHO SHOULD PAY

	Fair %	Unfair %	Not Sure %
The shareowners of investor-owned electric utilities	73	23	4
Electricity consumers nationally	51	45	4
Electricity consumers in eastern and southern states where most coal and oil is burned	49	46	5

(continued)

"When it cannot be determined that an injury to someone living near a landfill was caused by wastes from a specific company, who do you think should pay for an injury to such a person -- the government, through general tax revenues, the industry that produces the waste, through a special tax on that industry, or a combination of companies that used the landfill?"

INJURY TO PERSON LIVING NEAR LANDFILL -- WHO SHOULD PAY

	%
Government	5
Industry producing waste	31
Combination of companies using landfill	58
None of these (vol.)	2
Combination (vol.)	3
Not sure	1

"Congress has delayed passing a bill that will extend the super-fund hazardous waste cleanup program for five years at a cost of $10 billion. Do you favor or oppose Congress passing such a super-fund hazardous waste cleanup program appropriation of $10 billion.

FAVOR CONGRESS PASSING SUPER-FUND BILL

	%
Favor	67
Oppose	29
Not sure	4

"Now suppose in the congressional elections this year, you found a candidate for Congress in your district whose views you mostly agreed with. Then suppose that candidate took a position on controlling air and water pollution and cleaning up acid rain and toxic waste dumps that you disagreed with completely. Would you certainly not vote for that candidate, probably not vote for that candidate, or could you still vote for that candidate?"

VOTE FOR CANDIDATE WITH DIFFERENT STAND ON ENVIRONMENT THAN YOURS?

	Could Not Vote For %	Probably Not Vote For %	Could Still Vote For %	Not Sure %
TOTAL	16	44	36	4
Pro-environment (Base: 67 percent favor in previous question)	10	29	25	3
Anti-environment (Base: 29 percent oppose in previous question)	6	13	10	*

* = less than 0.5 percent

(over)

METHODOLOGY

This Harris Survey was conducted by telephone within the United States between April 5th and 8th, among a cross section of 1,254 adults nationwide. Figures for age, sex, race and education were weighted where necessary to bring them into line with their actual proportions in the population.

In a sample of this size, one can say with 95 percent certainty that the results have a statistical precision of plus or minus three percentage points of what they would be if the entire adult population had been polled.

This statement conforms to the principles of disclosure of the National Council on Public Polls.

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STATEMENT ON S. 2203 - THE NEW CLEAN AIR ACT
SENATE ENVIRONMENT AND PUBLIC WORKS COMMITTEE
OCTOBER 2, 1986, WASHINGTON, DC

I am Dr. Edwin H. Ketchledge, by title Distinguished Teaching Professor Emeritus of the State University of New York College of Environmental Science and Forestry, Syracuse. I have spent the past thirty-seven years researching and teaching the natural resources and natural history of the Adirondack Mountains. I am now retired and living at the base of Whiteface Mountain, where I have been involved in recent years in research on the acid rain and spruce decline problems that plague our region. I speak today as a private citizen in support of the position of the Adirondack Mountain Club, of which I am a member and officer. We urge passage of S 2203, the "New Clean Air Act".

I wish to make three central points in explaining our deep concern on the issues at hand:

#1. Key to the matter is the fact the Adirondack Mountain region is ecologically the most sensitive and susceptable area in all the eastern United States to atmospheric pollution.

Geologically we are part of the ancient Pre-Cambrian Canadian Shield, a massive acidic landform of igneous and metamorphic rocks, which means we are much like a gigantic granite bathtub. In effect, our 6,000,000 acres are a single big rock, impervious to water. We lack the subsurface drainage characteristic of the fractured Paleozoic rocks found elsewhere in the eastern United States, which allows acidified rainwater to drain underground. Rather, our acidified rainfall (three inches each month of the year) must drain off across the landscape, polluting some 3,000 miles of rivers and streams and 2,700 lakes along the way.

The matter is complicated by the fact our soils are very young glacial soils only 10,000 years in development, infertile to start with, acid in reaction, low or devoid of carbonates and sesquioxides, and thus low in ability to neutralize atmospheric poisons and pollutants. Simply put, our waters and our soils do not have adequate buffering capacity to neutralize the foreign chemicals now flowing into them and damaging the ecosystems they sustain.

Moreover, we happen to lie immediately under the major storm tracks whereby the midwestern regions export their industrial poisons out of their backyards and into ours; were their geography to be switched with ours, I am sure they would feel as intensely as do we about the fallout we now experience in their place!

Point one, then: we who receive the heaviest load of pollutants are endowed with the least ability to handle it.

#2. Damage to aquatic ecosystems. The vegetative impact of acidified deposition on aquatic ecosystems is relatively clear, direct, linear; few ecologists doubt the reality of it, or the seriousness. Nor do we in the northeastern states experience it alone. Data from ice cores in south

Greenland[1], for example, show that the "sulfate concentration has tripled since approximately 1900" and "the nitrogen concentration has doubled since approximately 1955". In Great **Britain**[2] researchers have demonstrated that lakes in Galloway "have been acidified by approximately 1 pH unit since about 1840"; these researches "substantiate the acidic deposition hypothesis by demonstrating substantitive increases of heavy metals Pb, Cu and Zn in the sediments since about AD 1800". I cite these examples solely to stress the massive and world-wide impact of anthropogenic emissions from both North America and Eurasia in the industrial age, and to repeat the geographical happenstance that threatens especially the integrity of fragile aquatic ecosystems of the Adirondacks.

Here in the Adirondacks our aquatic systems suffer dramatically from the toxic effects of dissolved aluminum on fish life. The National Academy of Sciences has reported on our problem.[3] The New York State Department of Environmental Conservation advises us[4,5] that from their studies of over 92% of the 246,271 acres of lake waters in the Adirondacks, 19% are already below 5.0 pH, the Critical level for fisheries, and another 25% are in the 5.0-6.0 Endangered level; over 200 of our lakes are already devoid of fish and we fear many more are on the threshold of collapse. Many studies underway in the Adirondacks by a variety of academic institutions are now working out the pathways and processes involved in the acidification phenomena, most focusing on the biological shifts induced by increasing acidification over the past decades. Our biggest fear is that the declining fisheries are the forewarners of other subtle processes underway that in another decade or two will be manifest in declines of other natural resources, perhaps our very health.

My point, please, is that aquatic ecosystem scientists accept lake acidification as a proved fact, and most current studies are trying to quantify the environmental impacts in order to demonstrate the ecological consequences throughout the food chains. The major research is in, the finishing details remain. An overwhelming consensus pleads for the federal government to get moving on controls to reduce sulfur and nitrogen emissions.

#3. Damage to forest ecosystems. The damage to forests is less clear because most terrestrial ecosystems are far more complex, with more interacting variables and many buffering mechanisms as compared with aquatic systems. This means that sulfur and nitrogen emissions compound rather than directly cause such forest problems as the current spruce decline on high mountain slopes. The impact of the sulfur and nitrogen appears to be more an additional stress factor in systems already struggling with numerous natural forces, such as occasional summer drought, earlier onset of cold temperatures in the fall in recent years and outbreaks of various forest pests, for example. Because acidic deposition is contributory rather than causal, forest scientists are trying to assess the respective role of every stress factor, both natural and anthropogenic, in evaluating forest problems. It appears that in the presence of sunlight, sulphur and nitrogen oxides react with various volatile organic compounds in polluted air producing a host of photochemical oxidants that are highly poisonous to plants. Ozone in particular is implicated in the damage to and death of forests in California and the Appalachian Mountains. Meanwhile, the leaching of soil nutrients and the mobilization and subsequent accumulation of toxic metals in plant tissues are directly related to depressed pH levels in the soil induced by acid deposition.

Keeping abreast of the technical and scientific literature, we realize sulfur and nitrogen emissions are bad. They upset ecosystems, though in 1986 it is too early yet to explain in precise detail just how bad and in what combinations. On the other hand, we do know the problems continue, which in turn tells us the sulfur and nitrogen, however much they have tended to level off in recent years, are still far too high to be acceptable.

My plea in behalf of the Adirondack Mountain Club, please, is that though we do not yet have answers to all the ramifications of acidified deposition, everyone acknowledges that sulfur and nitrogen levels must be reduced if we are ever to reverse the pollution which poisons our ecosystems.

I thank you kindly for this chance to speak for our membership.

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199TH LEGISLATIVE DISTRICT

STATEMENT OF JOHN H. BROUJOS (D-199th, Cumberland, Adams, and York Counties), Chairman of the Bipartisan Legislative Acid Rain Caucus, General Assembly of the Commonwealth of Pennsylvania on October 2, 1986 before the United States Senate Environment and Public Works Committee.

I have been requested to speak on the concern of Pennsylvania for the control of acid deposition and ozone as they affect crops.

The Bipartisan Legislative Acid Rain Caucus was formed in February, 1984. We have held hearings, journeyed to Washington to our Congressional and Senatorial Delegations, funded research at Penn State on the impact of acid rain on crops, and are preparing a bill for introduction in the General Assembly. We have thirty members.

The subjects of acid rain and ozone can be addressed separately or together. Individually, ozone and acid rain create serious and distinctive environmental problems. Where in some cases acid rain may not have a substantial adverse effect, together there may be an interaction creating damage.

Ozone may be the primary toxic agent causing damage to plants, which have some capability to repair the damage. However, the impact of acid rain may prevent this repair, since it has high acidity as a result of the lower ph.

Whereas scientists are cautious in their conclusions on the impact of acid rain on crops, there appears little reluctance to conclude emphatically that ozone has a high degree of toxicity.

Ozone results from car emissions of oxides of nitrate and hydrocarbons, combining with sunlight. Scientists have concluded that the environment--soil moisture, soil fertility, light intensity and quality, relative humidity, temperature, and biological disease--influences the magnitude of plant response to ozone.

Ozone causes economic loss to crops throughout the United States. A major study has been conducted through the National Crop Loss Assessment Network (NCLAN), EPA funded. This study involves research facilities at Penn State University, Pennsylvania; Riverside, California; Ithaca, New York, and Chicago, Illinois, among other areas. It is a 5 year study, converting existing data based on the scientific model into an economic model to predict crop loss. There is a tentative indication of an annual loss of $2 billion annually. On the other hand, there is no clear present prediction of crop loss from acid rain.

Another distinction between acid rain and ozone is the nature of the scientific studies conducted with respect to their impact. The higher degree of certainty with ozone results from almost 30 years of data and research, commencing approximately 1958. Studies on the effect of acid rain on crops are about 10 years old. Scientists prefer to accumulate data over a long period of time through a variety of research institutions.

The initial task is identification of the best methodologies for study. During early studies of this nature, there may be no clear cut causal relationship. However, there are indications that justify further study.

With acid rain, Brookhaven and University of Illinois scientists have found a type of soybean sensitive to acidic rain treatments. Illinois also found that drought-stressed plants were more sensitive to acidic rain than well-watered plants. There are indications that the effectiveness of a compound to control diseases, such as pesticides, may be decreased if its rate of wash-off from leaf surfaces is accelerated by acidity in rain. "Consequently, costs of production may be affected either by a reduction in the efficacy of applied sprays or by an increase in the amount of material needed to maintain an adequate level of control." (Cornell University, 1984)

"There is a growing interest in the potential of acidic rain to either exacerbate or predispose plants to the gaseous air pollutant, ozone. This hypothesis was first proposed by Prinz in Germany to try and explain death of the forests in that country. The rationale ... is that ozone, which is very toxic to plant cells, causes the membranes of cells to leak and that when plants are subsequently exposed to acidic rain, the nutrients which are leaking out of the cells are leached away from the leaves faster than they would be if rain were less acidic..." (Dr. Eva J. Pell, Penn State University, Department of Agriculture, Department of Plant Pathology)

Penn State has been conducting research in the ozone area for over 20 years. The university has an on going project with the Electric Power Research Institute (EPRI), affiliated with NCLAN; has studied the effects of ozone and sulfur dioxide alone and in combination on the yield and quality of potatos; and has been studying the mechanism by which ozone reduces photosynthesis and how this relates to reduced plant productivity.

EPA has published Air Quality Criteria for Ozone. (See Volume III, EPA, Environmental Criteria and Assessment Office, Research Triangle Park, NC 27711)

States prefer action by the federal government, imposing federal standards. Execution and enforcement may be by the states, as in HR 4567.

But we urge action. Do not be sidetracked by the bromide: "Let's study the matter first." Pennsylvania was down to its last two bald eagles while DDT was studied. The White House says it best:

> "Delaying control action for the 10 to 20 years needed to fully assess the acid rain phenomena is not worth the risk of near permanent damage to lakes, forests, and soils."
>
> - White House, Office of Science and Technology; Acid Rain Peer Review Panel. September 1984

OCT 02 1986

OCTOBER 2, 1986

TESTIMONY ON S.2203, THE NEW CLEAN AIR ACT - Committee on Environment and Public Works

I am Ruth Duba, Associate Director, Washington Office of the Presbyterian Church (U.S.A.). I am testifying today on behalf of the General Assembly of the Presbyterian Church (USA) and the United Methodist Board of Church and Society. These two agencies have a long interest in public health and environmental justice. Beginning in late 1983 representatives of our denominations began researching the environmental and human health problems related to acid rain. We have had a much longer history of concern with other clean air issues. We have participated in a National Council of Churches sponsored taskforce on acid rain that includes representation from most major protestant denominations. Together we are committed to educate our constituents as to the causes of acid rain and associated air pollution and and to recommend solutions to these problems that will be both ecologically sound and economically just.

In a 1984 statement issued in Toronto, Canada, our two agencies joined with 23 other United States and Canadian church bodies in calling for prompt action by both our governments to confront the problem of acid rain and its associated air pollution. We supported six public policy guidelines consisting of:

1. Vigorous international and bi-lateral cooperation by the United States and Canada to control acid rain.

2. Clean up of a sufficient magnitude to reduce emissions of sulfur dioxide and oxides of nitrogen to a level necessary to protect the health of our most sensitive individuals and environments.

3. Industrial and pollution abatement/control strategies that are:

   a) environmentally sound,
   b) preserve existing jobs and create new jobs,
   c) protect the poor (from rapid electric rate increases and ill health associated with acid rain and air pollution), and
   d) encourage energy conservation and renewable energy systems.

4. Adequate funding of the cleanup that will:

   a) achieve a roughly 50 percent reduction in acid rain causing emissions,

   b) distribute costs fairly among corporations, governments and consumers, taking specific steps to protect the poor,

   c) support research into environmentally sound technologies.

5. Increased citizen participation in the accountability processes pertaining to sources and reduction of acid rain.

6. Rigorous enforcement of clean air laws and regulations.

The individual policies of our church bodies closely parallel the recommendations of the Toronto statement. We believe that S. 2203 addresses many of the concerns we have raised.

We strongly support the provisions of S. 2203 that call for mandatory negotiation of a North American treaty for the control of air pollution. The United States, Mexico and

Canada suffer collectively from each others transboundary air pollution.

The proposals to require operating limits on the plants which pollute the most is consistant with our desire to greatly reduce acid rain causing pollutants. We have some concern that the proposed operating reductions may not achieve the necessary reductions in pollution, but support them as a good beginning.

Evidence suggests that oxides of nitrogen and ozone make significant contributions to both human and environmental health destruction. We support these provisions of the bill. We believe that further control of these pollutants are both technologically achievable and necessary.

We do not have specific policy regarding tariffs on products produced by processes that fail to use pollution controls. It is possible, however, that this may help encourage needed pollution controls in other nations.

Theologically speaking, we see acid rain and associated air pollution as an example of our inability to preserve God's gifts of air, land, water and living things for our neighbors. Working against such a serious threat to God's creation as acid rain will require much commitment, perseverance, energy, and faith. S. 2203, The New Clean Air Act, takes seriously our responsibility as stewards of the earth. We encourage the passage of this bill without delay.

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COMMENTS OF DICK KAMP, DIRECTOR BORDER ECOLOGY PROJECT

CONCERNING S2203

Before the Committee on Environment and Public Works

U.S. SENATE

WASHINGTON, DC

OCTOBER 2, 1986

Health Damage from SO2 in Southern Arizona

Border Smelter Agreement
and its Relationship to
Border Hazardous Materials Agreement

Compliance Deadline for Smelters

Smelter Crisis Education Project

Mr. Chairman and members of the committee, thank you for providing me the opportunity to give you a perspective from the Southwest. My name is Dick Kamp and I am the director of the Border Ecology Project (BEP), a non-profit advocate for solutions to US-Mexico border environmental problems, as well as a staff writer for the Wick newspapers in rural Southern Arizona.

BEP has been the principle non-governmental force behind developing an agreement to control US-Mexico border area smelter emissions.

I am here to place my support behind S2203, to discuss compelling field evidence of S02 endangerment of the lives of sensitive Cochise County, Arizona individuals, to ask you to include language in S2203 that is currently in HR4567 concerning a bi-national smelter agreement, and to ensure 1988 compliance with the Act by all smelters.

EPA has focused much of their health criteria documents of 1982 and 1986 on the impacts of 3 to 30 minute exposures of high levels of S02 on asthmatics and other sensitive individuals who comprise from 4 - 13% of the U.S. population. Lab studies have shown that "short term peaks," known in the regulatory jargon now as STPs, of more than .4ppm of S02 for three minutes cause complete bronchial constriction in approximately 1/4 of the active asthmatics tested (see Appendix A).* Cold and dry air have been shown to aggravate these effects.

These studies differ greatly from the historical regulatory attention paid to health impacts from lengthy S02 urban-industrial inversions -- which led to the 24 hour health standard we have had for sixteen years.

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*The appendices referred to here and throughout this statement have been retained in committee files.

For decades, Cochise County was an unobserved medical lab where thousands of asthmatics were subjected to uncontrolled SO2 emissions from the Phelps Dodge copper smelter in Douglas. Since 1985 the area has been under close scrutiny by EPA and Arizona Dept. of Health Services (ADHS) because of the very high levels and enormous frequency of STPs.

The area surrounding the smelter is high desert, naturally dry, and frequently subject to temperature extremes.

In 1985 the Environmental Defense Fund petitioned ADHS and EPA to provide relief for several asthmatics whose physicians testified that their patients were suffering life endangering attacks as a result of SO2 emissions from the Douglas smelter.

As a result, both agencies studied 1985 SO2 monitoring data from the PD smelter and it became clear that short term peaks of SO2 were at least 10 times the .4 ppm level adequate to cause attacks to active asthmatics in the lab, and that STPs in excess of 1 ppm occurred hundreds of times per year. Late last year ADHS began to continuously monitor the ranch of an asthmatic pig farmer, June Hewitt, who had a history of severe attacks that she and her doctor correlated to smelter emissions. The Hewitt ranch is a full 12 miles from the Douglas smelter.

Political pressure to control Douglas smelter pollution on the merits of ambient violations, and health endangerment, combined with international pressure to control the Douglas-Nacozari-Cananea "smelter triangle." On July 29, 1986 Phelps Dodge, EPA and ADHS lodged a consent decree in U.S. District Court to close Douglas no later than January 15, 1987.

The decree included an interim SO2 short term peak "standard" that prohibited the smelter from exceeding 2.0 ppm/6 minutes of SO2 ambient average. EPA emphasized that this concentration -- 4 times the level suggested as adequate to protect asthmatics by EPA medical investigators -- was not an agency-condoned standard. EPA officials said that it was their "hope that this level would relieve the problems of asthmatics . . . ," but they failed to add the unspoken conclusion: . . . while not posing a threat to the regulation of other high SO2 emitting power plants or smelters.

On the morning of August 12, 1986, two weeks after the consent decree went into effect, June Hewitt collapsed with a severe asthma attack (appendix B), and she was administered high doses of steroids that only somewhat relieved her suffering. ADHS examined her SO2 monitor after she alleged that it was heavy smelter pollution that caused the attack and they found that two 6-minute peaks at the time of her attack were "at or near 2.0 ppm SO2." This was June's first attack in months, and her monitor had registered no high peaks prior to that time.

So much for the 2.0 ppm as a safe level for asthmatics.

The SO2 monitor also recorded 80% of a 3-hour exceedance. Unfortunately, the high levels at her ranch could not be considered a possible STP exceedance because ADHS and EPA believed that it was impossible for such levels of SO2 to show up 12 miles from the source, and the Hewitt monitor was not part of the consent decree.

Five other asthmatics -- none of them monitored -- and their physicians alleged that they were having smelter-related attacks during that same 2-3 day period of heavy thermal inversions.

If S2203 passes it is going to reduce total SO2 emissions substantially. Many high SO2 emitters will be cut back; short term peaks of SO2 will thus drop in many locations and life-endangering episodes will be reduced. Millions of people sensitive to respiratory contaminants -- such as the Cochise County asthmatics -- need the protection of this bill.

EPA must also respond to a lawsuit filed in December, 1985 by 7 states and 5 environmental groups, both on behalf of the Cochise County asthmatics and to stop acid rain. The suit calls for EPA to promulgate new short term SO2 standards under the agency's rulemaking procedure. If the EPA is ordered by the court to respond, such promulgation will dovetail well with this bill to eliminate some of the worst health-endangering SO2 emitters. EPA has done little analysis of SO2 peak-to-mean ratios to determine where health danger lies outside of Arizona.

S2203 lacks language contained in HR 4567* that defines steps which Congress feels should be taken to secure a negotiated agreement with Mexico (an annex to the 1983 La Paz agreement on border environment) to control emissions from the Nacozari, Sonora, and Cananea, Sonora, Mexico copper smelters. This language has the support of members of the Arizona Congressional delegation, some of whom do not yet support HR 4567, because of the enormous potential impact of the Nacozari smelter's possible 1400 TPD (1/2 million TPY) of SO2 on the Southwest.

Progress toward arriving at a bi-national agreement has been slow, but not totally discouraging (appendix C and D). The Nacozari smelter has had major operational difficulties which have prevented it from operating at over 1/4 capacity. The Mexican government has "in principle" committed to installation of an acid plant, first by December, 1987, now by March, 1988. To date the nervous acid plant contractor, FENCO of Toronto, Canada, has no contract, although the Mexican National Bank has guaranteed repayment to Canada's ex-im bank of $50 million in loans for the pollution control.

To date the Mexican EPA, SEDUE, has balked at a total commitment to a smelter annex, although, according to a September 5 EPA-SEDUE "joint communique," each side "looks forward to signing both annexes."

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* HR 4567, Title III, Section 301, "International Cooperation"

The other annex referred to in the communique introduces a new wrinkle to the air negotiations. During the recent binational meetings Mexico proposed an annex to the La Paz agreement to control transboundary movement of hazardous materials.

The air annex and hazardous materials annex were "put on a parallel track," politically linked according to negotiators; however, the Mexicans did not set a date for their next negotiating meeting on the smelter issue.

I have attached detailed information and further comments on the proposed hazardous materials annex and its relationship to the air issue (appendices E - F), but the gist of this is that the smelter negotiations are strung out and that it is important that S2203 embody specific language similar to HR 4567 to keep the process moving.

There is one other wild card left in the smelter negotiating process, ensuring that the one operating smelter applying for a Section 119 NSO, the Magma San Manuel smelter, is required to submit a schedule that states how they will comply with the Clean Air Act by January 1, 1988, and for S2203 to ensure that Magma operates only with an enforceable NSO or consent decree. Magma has not committed in writing to full compliance by January 1, 1988.

Phelps Dodge stated in their recent consent decree that they reserved the right to ask for the decree to be negated should any other smelter be given an NSO or other EPA order with provisions inconsistent with those imposed upon them. Failure of the PD consent decree to be adhered to will definitely endanger negotiations with Mexico over Nacozari control.

We have a kind of a domino-smelter theory here. Language should be incorporated into S2203 equivalent to HR4567, Section 103, "Smelters."

The PD consent decree represents an encouraging step forward in U.S. policy relating to protecting our neighbors' airshed. It requires the early closure of Douglas, as well as some interim protection of Sonoran ambient air quality "to fulfill the U.S. commitment to protect Mexican air quality . . . ."

It would be a major step backward if that decree were not entered and adhered to.

BEP wishes to thank the sponsors of S2203 for their comprehensive efforts to protect North American air. We hope that our comments can help strengthen this bill.

Thank you,

Dick K

NEDA
CAAP
CLEAN AIR ACT PROJECT

National Environmental Development Association · 605 Fourteenth Street N.W. Washington D.C. 20005 · (202) 638-1230

JOHN QUARLES, Project Chairman

Statement of
JOHN QUARLES, Chairman
NATIONAL ENVIRONMENTAL DEVELOPMENT ASSOCIATION'S
CLEAN AIR ACT PROJECT
before the
COMMITTEE ON ENVIRONMENT & PUBLIC WORKS
UNITED STATES SENATE

October 2, 1986

Mr. Chairman and Members of the Committee:

I appreciate the opportunity to appear before you today to testify on behalf of the National Environmental Development Association's Clean Air Act Project, NEDA/CAAP, with respect to S.2203, a proposed amendment to the Clean Air Act, and other similar legislation.

The membership of NEDA/CAAP includes a number of large national corporations in several industrial sectors and the labor unions of the Building and Construction Trades Department of the AFL-CIO. NEDA/CAAP has represented its membership over the past several years in a continuous effort to encourage the adoption of construction modifications to the Clean Air Act. We particularly have worked to streamline its complexities and meet needs for protection against air pollution in a manner that does not unduly interfere with economic growth and national development. We continue to believe that these needs require thoughtful consideration by Congress.

NEDA/CAAP welcomes these legislative hearings and appreciates the efforts by this Committee to focus its attention on the Clean Air Act. We recognize that at this late stage in the Congressional calendar it is not realistic to anticipate enactment of legislation during this Congress. However, we do view these hearings as having importance from the perspective that amendments to the Clean Air Act are likely to be addressed at an early stage in the 100th Congress. These hearings may contribute to the foundation for deliberations which will occur in 1987.

Two years ago, I testified before this Committee for NEDA/CAAP that Congress must not consider acid rain legislation alone, but only as part of a broader review of the entire Clean Air Act. Today that position is even more valid than it was two years ago. As additional time has passed, and particularly as the 1987 final deadlines under the current Act have drawn ever more imminent, an urgent need exists to review the full record of experience under the entire regulatory framework established by the Clean Air Act.

S.2203 would establish a major national commitment under federal law to reduce emissions of sulfur dioxide and nitrogen oxides in an effort to reduce the phenomenon known as "acid rain." We believe it will be impossible in the brief time allowed by these hearings to do more than scratch the surface in evaluating the numerous issues raised by this proposed legislation. Even more importantly, we consider it essential that any consideration of amendments to the Clean Air Act address other related issues of urgent importance at the same time. Clearly these hearings will not even begin to address the full range of related critical issues. Therefore, while commending the Committee of undertaking these hearings as a valuable first step in the process, our most important recommendation to the Committee is that it should make a commitment at this time that a full and thorough evaluation of all pertinent issues will be undertaken during the next Congress. We need a full, thorough, and orderly public debate on these issues before the legislative process moves into a decision-making mode.

S.2203 would establish an ambitious program of new controls on utility boilers, industrial boilers, and other sources of emissions of sulfur dioxide and nitrogen oxides. In seeking to control such a wide range of sources, it goes far beyond previous proposals for acid rain controls in terms of the depth and breadth of its impacts on American industry, employment, and the public at large. In light of this expansion of the scope of the previous debate over acid rain controls, NEDA/CAAP urges that the effects of this bill be carefully evaluated and fully debated before judgement is reached on the merits of its proposals.

The major concern of NEDA/CAAP with respect to S.2203 focuses on its prospective impacts on industrial sources. Generally speaking, industrial boilers and other industrial sources are considerably smaller and contribute a relatively small percentage of aggregate emissions associated with acid deposition. The emissions reductions obtained from these sources would be an even smaller percentage of the total, and would be far less cost effective.

In addition to reservations concerning the provisions contained in S.2203, NEDA/CAAP has even stronger concerns over what is omitted from this bill. In particular, we consider it essential that any legislation amending the Clean Air Act address the questions raised by the impending deadlines applicable to nonattainment areas.

EPA currently anticipates that over 70 metropolitan areas will fail to achieve compliance with ozone standards by the current statutory deadline of December 31, 1987. In all such areas, current provisions of the statute indicate that a moratorium against construction of new sources will then go into effect. If this result occurs, it will have devastating adverse effects on the economy of each affected area, thrusting distress into millions of homes across this country. New cleaner sources will not be built. Moreover, the expiration of these statutory deadlines has the _de facto_ effect of freezing the development of further air quality control efforts.

The consequence is that the present statutory arrangement will cause economic disruption with no corresponding air quality benefit. This situation commands Congressional resolution. No set of amendments to the Clean Air Act should be considered by Congress unless it resolves this problem.

We also strongly believe that if any amendments are adopted to establish a major national program to reduce emissions of sulfur dioxide and nitrogen oxides, the existing statutory framework should be modified to eliminate the PSD requirements applicable to sulfur dioxide. The whole purpose of the PSD program is to prevent an increase in emissions of the specified pollutants (particulate matter and sulfur dioxide).

The PSD program has produced virtually no national benefits to compensate for the volumes of red tape it imposes on companies wishing to expand and modernize their productive facilities. One basic reason for this lack of benefit is that nationwide trends of sulfur dioxide emissions have been downward, not on the increase. This means that although the detailed regulatory review is not removed, its whole purpose is nullified because its limitations are never approached. If one assumes that existing control requirements will be supplemented by a profoundly ambitious program to reduce emissions of sulfur dioxide, continued application of the sulfur dioxide PSD requirements becomes even more ludicrous.

A similar argument applies to nitrogen oxides. Due to the operation of section 166, EPA will soon begin to develop a PSD program to control nitrogen oxides. A major new control effort for nitrogen oxides related to acid rain will make the creation of a PSD program for this source unnecessary. We believe that appropriate modifications to remove these PSD requirements, at least in areas of substantial population and industrial density, should accompany any proposals to establish special acid rain controls.

The Committee should also consider whether section 123, which is the basis of the so-called "Tall Stacks" rules, makes any sense if there is a sulfur dioxide program for acid rain. This program imposes costs and is fraught with uncertainties due to the inaccuracy of the models on which it relies. In terms of both local ambient effects and long-range transport, it would not produce significant benefits in conjunction with acid rain controls.

A number of other important issues raised by the Clean Air Act also warrant Congressional consideration. Because it is clear that these issues will not be addressed during this Congress, I will not expand further on them at this time. NEDA/CAAP looks forward, however, to participating in the debate on these issues when the new Congress reconvenes. We are hopeful that the leadership of this Committee will plan now to schedule a full and adequate opportunity to consider all relevant issues when it next turns its attention to proposed amendments to the Clean Air Act.

Thank you.

# # # #

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ELCON

STATEMENT OF THE
ELECTRICITY CONSUMERS RESOURCE COUNCIL (ELCON)
TO THE-
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
UNITED STATES SENATE
ON
S. 2203 -- THE NEW CLEAN AIR ACT
OCTOBER 2, 1986

I am John Anderson, Executive Director of the Electricity Consumers Resource Council (ELCON). I am pleased to appear before this Committee to present ELCON's views on S. 2203 -- the New Clean Air Act.

ELCON is an association of large industrial consumers of electricity with facilities in most of the 50 states and in many foreign countries.[1] Our members produce a wide range of products including steel, aluminum, motor vehicles, chemicals, glass, industrial gases, food products and textiles.

ELCON members consume approximately ten percent of all electricity sold to industrial customers and nearly five percent of all electricity consumed in the United States. Our members require an adequate and reliable supply of electricity at reasonable prices based on the costs incurred in providing service. Due to the impact of any acid rain legislation on the cost and reliability of electric service, ELCON has a significant interest in the proposed legislation.

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[1] This statement is presented in behalf of the following ELCON members: Air Products and Chemicals, Inc.; Anheuser-Busch Companies, Inc.; Armco Inc.; Bethlehem Steel Corporation; Cone Mills Corporation; Corning Glass Works; Dow Chemical U.S.A.; ED&S Division of Occidential Chemical Corporation; E.I. du Pont de Nemours and Company; General Motors Corporation; Hershey Foods Corporation; Hercules Incorporated; Kaiser Aluminum and Chemical Corporation; Olin Corporation; PPG Industries, Inc.; A.E. Staley Manufacturing Company; Stauffer Chemical Company; and Union Carbide Corporation.

SUMMARY

I. Implementation of S. 2203 could result in substantial economic dislocation for electricity-intensive U.S. industry:

A. Any acid rain legislation will be expensive. Estimates of the costs of S. 2203 are especially high and range from \$7.3 billion to \$12.3 billion annually for SO_2 emission requirements. When including the NO_x requirements, estimates range from \$10.8-\$15.4 billion annually. Rate increases to industries could exceed 100 percent. Indeed, one study predicts that rate increases in one state could be nearly 150 percent.

B. The U.S. presently faces a relative price disadvantage for electricity with Canada and other industrialized nations. An expensive emission reduction program would increase this disadvantage.

C. The costs, and therefore the rate impacts, of S. 2203 would fall primarily on a few states. The Congressional Budget Office (CBO) estimates 10 states will be most impacted and a Temple, Barker & Sloan (TBS) analysis estimates between 8-24 states will incur rate increases of 10% or more. Rate increases to industrial electricity customers will be very substantial in these states.

D. Many electricity-intensive industrial firms in the states most affected are already in poor financial health. This is particularly true for aluminum, steel and chemical companies. This legislation would exacerbate their financial plight.

E. These additional costs will encourage electricity-intensive industrial firms to concentrate production in areas of the U.S. that are less affected or in foreign countries. Indeed, Canadian utilities are attracting the primary metal industry through offers of rate reductions of as much as 66 percent. Acid rain legislation would increase the attractiveness of these offers as it increases U.S. electric rates relative to those in other industrialized nations.

F. Loss of basic industry means loss of jobs in the basic industry. However, it also means loss of fabrication jobs and operations since economics often requires fabrication processes to be in close geographical proximity to basic industry.

II. The costs of S. 2203 have not been shown to be justified:

A. A link between implementation of S. 2203 and an improvement in environmental quality has not been established. We will not argue the fact that what comes up must come down. But we simply don't know that reducing SO_2 and NO_x emissions in certain locations will lower acidity in lakes or reduce tree damage. Indeed, the forest industry, which perhaps has more at stake than any other industry in the United States, has seen no evidence of forest decline due to air pollution. It has also stated that an ineffective program, that is one that produces uncertain results, may be worse than no program at all.

B. Additionally, emissions have declined and will continue to decline further without additional legislation due to existing new source emission standards and increased implementation of new coal burning technologies.

RECOMMENDATIONS

ELCON has studied carefully the acid rain issue.

Our members are very concerned about the environment. We agree with others that acid rain is a problem. We are also concerned, however, about the impact of the proposed legislation on U.S. industry. We believe that Congress must consider the effectiveness of

I. Implementation of S. 2203 could result in substantial economic dislocation for electricity-intensive U.S. industry.

A. Any emissions reduction program would be costly.

Estimates of the cost of S. 2203 vary. However, all show that this emissions reduction program is extremely expensive. For the 0.7 lb SO_2 limit, the CBO estimates that annual compliance costs would be approximately $8.8 billion in 1995 (in 1986 dollars) and that the net present value cost from 1986 through 2015 would be $93.6 billion. This is more than three times as high as CBO's estimate for H.R. 4567. A preliminary study by ICF, Inc., cited in Senator Proxmire's recent testimony before this Committee, finds even higher costs. This study estimates that SO_2 reductions may cost $12.3 billion annually and NO_x controls $10.4 annually. A TBS analysis estimates that the net present value of compliance costs for SO_2 requirements from 1991 to 2010 would be $91 to $103 billion in 1986 dollars. Table 1 summarizes these costs.

ELCON cannot verify the accuracy of these studies. The important point is that all of these cost estimates are extremely large. TBS predicts that changes would be required at 83% - or over 900 utility coal-fired generating units - in the U.S. This represents 230 million kilowatts of capacity. Large, small, new, old, peaking and baseload plants would all be effected.

All units 35 years or older would be defined as "New Sources" effective January 1, 1991. The ability of these old plants to meet

Table 1

Summary of Cost Estimates of Proposed Acid Rain Legislation

SOURCE	COST ESTIMATES
* CBO Analysis of S. 2203	\$8.8 billion/yr. in 1995 for SO_2 reductions (1985 \$)
** TBS Analysis of S. 2203	\$7.3 billion/yr. to 8.3 billion/yr. for SO_2 reductions; 10.8 billion/yr. to 15.4 billion/yr. for SO_2 and NO_x reductions (1986 \$)
*** ICF Preliminary Analysis of S. 2203	\$12.3 billion/yr. for SO_2 reductions \$10.4 billion/yr. for NO_x reductions

* Congressional Budget Office (CBO)
** Temple, Barker & Sloane (TBS)
*** ICF, Inc.

the emission requirements is doubful and thus, the number of retirements would be quite high. Furthermore, any plant not meeting the 0.7 lbs/MMBtu emission level will be limited in hours of operation or forced to scrub perhaps before more innovative and cheaper technologies are available.

Plant life extension programs may not be economic under S. 2203. If these extension programs are no longer feasible, the capital that would be required to replace these plants would be in addition to that needed to expand capacity to meet growing electricity demand.

B. The U.S. presently faces a relative price disadvantage for electricity with Canada and other industrialized nations.

1. The U.S. Price Disadvantage

U.S. industry faces a price disadvantage for electricity in relation to many other industrialized countries. Electricity rates in the U.S. have remained at a high level over the years, while industrial rates in other countries have declined.

An expensive emission reduction program would tend to increase this price disadvantage. Industrial electricity consumers can expect to pay a disproportionate share of the cost of any emissions reduction program.

At a time when industrial plant closings and lost sales to foreign competition are an unfortunate reality, U.S. industry seriously questions an expensive proposal which will worsen their competitive position and produce uncertain results.

C. The costs of S. 2203 would fall primarily on a few states.

CBO predicts ten states will be most impacted by the SO_2 requirements of this legislation. TBS estimates that between eight to twenty-four states will incur rate increases of 10 percent or more.

ELCON has estimated the cost to electricity consumers of S. 2203 based on the two TBS scenarios. Scenario A resulted in a cost of $10.8 billion/yr. and Scenario B a cost of $15.4 billion/yr.

Table 2 shows that rate impacts for residentials under the TBS Scenario (A) would be as much as 59 percent in one state. For industrial consumers, rate impacts of over 90 percent are predicted. Under Scenario (B), residential rates could rise by over two-thirds and industrial rates by over 100 percent on a statewide average basis. Industrial rates may rise by over 10 percent in 34 states under Scenario (B).

D. Many industrial firms in the states most impacted are in poor financial health

The states most effected by this legislation account for a large percentage of total U.S. employment in manufacturing. These states, also contain a substantial proportion of electricity-intensive industry which has been struggling to compete in domestic and foreign markets. We cite a few examples to highlight basic industries' current situation:

TABLE 2

ELECTRIC RATE IMPACT OF S2203
(based on TBS analysis)

STATE	ANNUAL COST OF S2203 (per TBS estimate) (A) (thousands of 1986 $)	ANNUAL COST OF S2203 (per TBS estimate) (B)	COST OF S2203 PER KWH (A)	COST OF S2203 PER KWH (B)	% INCREASE IN RESIDENTIAL RATES (A)	% INCREASE IN RESIDENTIAL RATES (B)	% INCREASE IN INDUSTRIAL RATES (A)	% INCREASE IN INDUSTRIAL RATES (B)
Alabama	$387,106	$514,188	0.75	1.00	11.7%	15.6%	16.1%	21.4%
Arizona	$96,519	$182,776	0.30	0.56	3.6%	6.8%	5.7%	10.8%
Arkansas	$101,330	$141,895	0.42	0.59	5.5%	7.7%	8.8%	12.3%
California	$45,747	$346,372	0.03	0.19	0.3%	2.4%	0.3%	2.5%
Colorado	$70,870	$189,691	0.27	0.72	3.9%	10.5%	6.3%	16.8%
Connecticut	$14,786	$130,977	0.06	0.55	0.6%	5.5%	0.8%	7.3%
Delaware	$42,109	$78,790	0.66	1.23	7.2%	13.5%	12.8%	24.0%
Dist. of Col.	$602	$10,812	0.01	0.13	0.1%	1.9%	0.1%	2.1%
Florida	$232,076	$573,790	0.21	0.51	2.4%	6.1%	3.6%	9.0%
Georgia	$467,414	$564,191	0.74	0.89	11.5%	13.9%	16.5%	19.9%
Hawaii	$8,611	$65,481	0.13	0.99	1.2%	8.7%	1.5%	11.3%
Illinois	$663,243	$946,548	0.67	0.95	7.4%	10.6%	12.5%	17.8%
Indiana	$659,132	$833,339	1.10	1.39	16.1%	20.3%	22.0%	27.7%
Iowa	$147,964	$198,804	0.58	0.78	7.6%	10.2%	12.5%	16.8%
Kansas	$106,287	$161,984	0.44	0.67	5.8%	8.9%	8.6%	13.2%
Kentucky	$408,845	$570,629	0.80	1.12	13.7%	19.1%	16.6%	23.2%
Louisiana	$72,394	$213,966	0.12	0.35	1.8%	5.2%	2.5%	7.5%
Maine	$8	$9,755	0.00	0.10	0.0%	1.2%	0.0%	2.1%
Maryland	$154,607	$271,850	0.39	0.69	5.4%	9.5%	8.2%	14.3%
Massachusetts	$110,406	$330,145	0.29	0.87	3.3%	9.7%	4.1%	12.4%
Michigan	$402,586	$642,531	0.56	0.90	7.6%	12.2%	9.7%	15.5%
Minnesota	$141,690	$178,828	0.37	0.47	5.8%	7.3%	8.5%	10.8%
Mississippi	$92,622	$134,104	0.35	0.51	5.7%	8.3%	7.3%	10.5%
Missouri	$501,560	$561,393	1.10	1.23	16.5%	18.5%	24.3%	27.2%

TABLE 2

ELECTRIC RATE IMPACT OF S2203
(based on TBS analysis)

STATE	ANNUAL COST OF S2203 (per TBS estimate) (A) (thousands of 1986 $)	ANNUAL COST OF S2203 (per TBS estimate) (B)	COST OF S2203 PER KWH (A)	COST OF S2203 PER KWH (B)	% INCREASE IN RESIDENTIAL RATES (A)	% INCREASE IN RESIDENTIAL RATES (B)	% INCREASE IN INDUSTRIAL RATES (A)	% INCREASE IN INDUSTRIAL RATES (B)
Montana	$7,516	$29,728	0.06	0.25	1.3%	5.2%	2.5%	9.7%
Nebraska	$80,623	$112,870	0.51	0.71	8.3%	11.6%	12.7%	17.8%
Nevada	$30,536	$53,923	0.27	0.48	4.3%	7.5%	6.1%	10.8%
New Hampshire	$19,886	$38,548	0.28	0.54	3.2%	6.1%	4.2%	8.1%
New Jersey	$78,985	$257,003	0.15	0.48	1.3%	4.4%	1.9%	6.1%
New Mexico	$68,374	$108,887	0.59	0.94	7.1%	11.3%	11.4%	18.1%
New York	$155,633	$466,004	0.14	0.42	1.3%	3.8%	2.6%	7.8%
North Carolina	$567,677	$710,330	0.77	0.96	11.1%	13.9%	17.7%	22.2%
North Dakota	$50,769	$86,960	0.76	1.31	12.7%	21.8%	14.4%	24.7%
Ohio	$1,044,029	$1,345,171	0.84	1.08	10.9%	14.0%	20.6%	26.6%
Oklahoma	$94,792	$207,256	0.26	0.57	3.9%	8.5%	5.7%	12.4%
Oregon	$12,957	$15,272	0.04	0.04	0.7%	0.9%	1.0%	1.2%
Pennsylvania	$802,065	$1,083,280	0.80	1.08	9.4%	12.7%	13.5%	18.3%
Rhode Island	$1,005	$14,423	0.02	0.27	0.2%	2.9%	0.2%	3.5%
South Carolina	$121,425	$211,037	0.26	0.46	3.8%	6.6%	6.3%	11.0%
South Dakota	$18,792	$30,417	0.34	0.55	5.2%	8.4%	8.1%	13.0%
Tennessee	$435,332	$592,125	0.64	0.89	13.2%	18.0%	13.1%	17.8%
Texas	$457,121	$847,079	0.21	0.39	2.8%	5.2%	4.3%	8.0%
Utah	$16,264	$76,891	0.12	0.56	1.5%	7.2%	2.4%	11.2%
Virginia	$156,317	$274,524	0.27	0.48	4.1%	7.2%	6.4%	11.2%
Washington	$68,250	$73,000	0.09	0.09	2.2%	2.3%	4.1%	4.4%
West Virgina	$728,742	$828,559	3.52	4.00	59.3%	67.5%	94.2%	107.1%
Wisconsin	$222,666	$328,335	0.53	0.78	8.0%	11.9%	12.6%	15.6%
Wyoming	$134,368	$183,095	1.29	1.75	22.2%	30.3%	36.5%	49.7%

- The recent LTV bankruptcy filing sent tremors through the already depressed steel industry. Total industry debt is close to $8 billion with 1985 marking the fourth year of staggering losses. The steel industry is one of the largest purchasers of electricity in the nation. A 10% increase in the cost of this power would add about $200 million to annual production costs.
- In 1984, 32 primary aluminum reduction plants were operating. Today there are only 25 left operating. Two plants were shut down in Arkansas; one in North Carolina; one in Louisiana; one in Alabama; one in Oregon and one in Texas. In every instance the principal reason for shutdown was because they were no longer competitive in electricity costs.
- 250 plants have closed in the last five years in the textile manufacturing industry. Cheap imports, often produced with subsidized electricity, have contributed to these closings.

E. These additional costs will encourage electricity-intensive industrial firms to concentrate production in areas of the U.S. that are less affected or in foreign countries.

The disproportionate cost impact of S. 2203 will cause industry to concentrate production in low-impact areas and to consider moving production to off-shore locations. These industries may be enticed to relocate through offers of low-cost electricity.

For example, Canadian utilities are attracting the primary metal industry through offers of rate reductions of as much as 66 percent. Acid rain legislation would increase the attractiveness of these offers as it increases U.S. electric rates relative to those in other industrialized nations.

F. Loss of basic industry also means loss of fabrication jobs and operations.

The loss of basic industry often leads to the loss of other, related industries as well. The economics of the basic metals industry, for example, often requires that fabrication processes be located in close proximity to sources of primary metal. Other industries which supply necessary production inputs, such as industrial gases, also are required to locate nearby.

The contribution of costly acid rain legislation to the flight of U.S. basic industry to off-shore locations should not be underestimated.

II. The cost of S. 2203 have not been shown to be justified.

A. A link between implementation of S. 2203 and an improvement in environmental quality has not been established.

Scientists have gained knowledge and are closer in defining the links between SO_2 and NO_x emissions and acidity in precipitation.

However, any linkage between acidity in precipitation and damage to the environment or between reduction in emissions and improvement in the environment remain largely unknown.

The forest industry, which perhaps has more at stake than any other industry in the United States, stated in April 30, 1986 testimony, that the industry has seen no conclusive evidence suggesting that forest productivity has been reduced by acidic deposition or air pollution. It also stated that an ineffective program, that is one that produces uncertain results, may be worse than no program at all.

Legislating emissions reduction at this time puts the cart before the horse. Many studies are underway -- funded by the federal government, the electric utility industry and others -- that are attempting to define this linkage. These studies are crucial. They should be completed and their findings analyzed before legislation mandating a major emissions reduction program is proposed.

B. Emissions Have Declined and are Expected to Decline Further Without Legislation

Emissions of SO_2 have declined significantly in recent years and are expected to continue to decline in the future without additional controls. In 1983, SO_2 emissions in the U.S. were 28 percent below their peak level of 1973. Electric utility SO_2 emissions declined 19 percent during this period despite a 60 percent increase in utility coal consumption. Industrial SO_2 emissions also decreased by 46 percent.[2] NO_x emissions during this period remained relatively stable with emissions from mobile sources declining by 9 percent in spite of a 5 percent increase in vehicle miles driven.

The National Coal Association (NCA) reports that SO_2 emissions from the nation's electric utilities have continued to decline through 1985 and are projected to remain on the decline through at least 1990.[3]

The NCA surveyed virtually every coal-fired electric utility generating plant above 50 megawatts in the United States. On the basis of actual coal consumption and hours of operation it determined that SO_2 emissions have declined at existing plants as well as at new plants.

The question must be asked if another layer of SO_2 controls are necessary on top of (1) new source performance standards, (2) state implementation plans, (3) national ambient air quality standards and (4) prevention of significant deterioration requirements. Other factors contributing to the decline in SO_2 emissions include regional shifts in electricity demand and changes in the sulfur content of coal.

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[2] Drew Lewis/William Davis, "Joint Report of the Special Envoys on Acid Rain." January, 1986.

[3] National Coal Association, "The Downward Trend in Sulfur Dioxide Emissions at Coal-Fired Electric Utilities," Washington, D.C., 1986.

The NCA expects these trends to continue into the future and projects a 16.9 percent decrease in electric utility SO_2 emissions between 1984 and 1990. This reduction would be achieved without additional emissions control programs.

Dan Quayle

STATEMENT SUBMITTED BY U.S. SENATOR DAN QUAYLE (R-IN)
TO THE SENATE ENVIRONMENT AND PUBLIC WORKS COMMITTEE
ON S. 2203, THE NEW CLEAN AIR ACT
September 26, 1986

Mr. Chairman. I appreciate this opportunity to express my views to this Committee on S. 2203, the New Clean Air Act. I want to register my strong opposition to this legislation, which is now before you.

I oppose this bill because I do not believe the coal-producing and industrial States of the Midwest should be required to foot the bill for the most expensive and comprehensive experiment in atmospheric science ever.

I oppose this bill because I remain convinced that there are as yet no conclusive data that sulfur-dioxide emissions in the Midwest are the primary source of acid rain in the Northeast. Nor is there sufficient scientific evidence that distant-source controls can reverse lake acidification.

I have consistently supported accelerated research into the science of acid rain -- on the atmospheric chemistry of sulfate formation and the transport and deposition of acidic materials. Where the harmful effects of acid rain are manifest, I believe local mitigation efforts should be undertaken and can be effective.

At the same time the Reagan Administration has recommended reductions in funding for other domestic programs, it has consistently requested increases in acid rain research efforts. To date, the Congress has supported the initiatives of the Administration that provide for approaching the problem of acid rain in a scientific manner, and that approach should not be abandoned now. The Administration has requested additional funding for acid rain research each year since 1981. Where EPA research on the science of acid rain was funded at $9.2 million in 1982, the 1987 fiscal year budget request for this vital purpose was $55.1 million.

Our research efforts now involve 12 federal agencies, national laboratories, States and the private sector. To date, we have completed a study on emission data, started a surface water survey, established deposition monitoring stations and worked on computer models. A great deal of important work is ongoing.

Furthermore, as a leading advocate of the $400 million Clean Coal Technology Reserve that Congress approved last December, I strongly back the three-year demonstration project now underway to develop cleaner, more efficient coal-use technologies.

Our current scientific understanding does not provide any justification for the draconian emission control strategy that is proposed in S. 2203. As EPA Administrator Lee Thomas stated in testimony in April before the House Energy and Commerce Subcommittee on Health and the Environment, "We do not believe that the current state of knowledge can sustain any judgment with respect to the level of emission reductions needed to prevent or eliminate damage."

Additionally, we should not fail to acknowledge that we have reduced our atmospheric emissions from fossil-fuel sources. Sulfur dioxide emissions, the alleged villain, declined 28 percent from 1973 to 1983, despite the fact that coal consumption by electric utilities increased by about 60 percent during the same period. According to the national surface water survey that has been initiated under the National Acid Precipitation Assessment Program, for sensitive areas in New England, an estimated 4 percent of the total waters surveyed have a pH level lower than 5.0. According to the January 1986 Joint Report on Acid Rain by the U.S. and Canadian special envoys, "On the basis of this survey data alone, it cannot be predicted what future acidification, if any, would occur if current levels of deposition were to continue."

Yet we do know what this bill will cost our economy. According to a June 1986 Congressional Budget Office (CBO) study, "Curbing Acid Rain: Cost, Budget and Coal-Market Effects," S. 2203 would cost nearly $94 billion by the year 2015. This cost would be passed on to utility ratepayers and consumers (who are in fact one and the same), and it is the equivalent of raising taxes to pay off approximately 5 percent of the current national debt.

According to the CBO report, to comply with S. 2203, the States of Illinois, Indiana, Missouri, Ohio, Pennsylvania and West Virginia would have to reduce their combined emissions by 77 percent by 1995.

Meeting that requirement would devastate my State. Indiana's production of soft-coal would decline, and one-fifth of our current mining jobs would be lost. Since coal production in Indiana is localized in 15 southwestern counties, the consequences of S. 2203 would wreak absolute havoc with the local economies there that depend on coal production.

Under S. 2203, utility rates in my State would likely increase by over 10 percent. This would significantly affect the ability of Indiana business and manufacturing entities to maintain or expand their operations, particularly in the economically distressed Northwest section, where utility rates are already among the highest in the Nation. Many Indiana industries face stiff foreign competition. Under S. 2203, such industries as steel, metals production, agriculture and glass and automotive manufacturing will face increased costs from electric rate hikes and other factors unique to their operations that will threaten their ability to remain competitive in our global economy. Individuals struggling to make ends meet, especially those on fixed incomes, would also feel the pinch from increased utility rates.

Other sectors of the Hoosier economy would also be harmed by S. 2203. Alcoa, which has a large aluminum smelting and sheet fabrication plant in the southwestern part of Indiana, depends upon Indiana coal for power production at its facility. To meet the requirements of the House acid rain bill, Alcoa would have to spend the equivalent of its annual payroll. The effect of the Senate bill on Alcoa's Indiana plant would be just as harsh.

Heavy-duty engine manufacturers in my State would have to meet new mobile source standards set by the Senate bill, yet they would be sorely pressed to do so under its time constraints. Equipment using these engines would increase in cost between .2 - 12.4 percent, and the engines' fuel consumption would rise between
5 percent - 15 percent.

The taxing costs associated with acid rain emission control proposals are staggering and would halt the economic recovery in my State. This bill would also entail onerous social costs, including unacceptable unemployment and dislocation, which would take a terrible toll on individual human lives. I do not believe the scientific evidence justifies the imposition of costs of this magnitude, and it is my intention to oppose this legislation strenuously should it appear in any form on the Senate floor.

STATEMENT OF THE WESTERN GOVERNORS' ASSOCIATION
SUBMITTED FOR THE RECORD OF HEARINGS
BEFORE THE SENATE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
SEPTEMBER 25, 26 AND 30 AND OCTOBER 2, 1986

The western governors, through the Western Governors' Association (WGA) and its predecessor organization, have been actively involved in congressional proceedings dealing with the Clean Air Act (CAA) since 1980. On several occasions since then the governors collectively have adopted policy resolutions offering constructive suggestions for amendments to the CAA, including acid rain provisions. In 1983 the governors adopted a set of western principles to guide and direct their legislative efforts on the issue. While the governors have historically avoided endorsements of legislative proposals on most issues, subsequent policies adopted in 1984 and 1985 strongly supported specific actions taken by the Senate Committee on Environment and Public Works to deal with acid rain. Specifically, the governors endorsed S 768 reported by the Committee in the 98th Congress and S 52 introduced by Committee Chairman Stafford early in the 99th Congress. Copies of each of these two resolutions are attached to this statement. The governors are therefore understandably disappointed with the direction that activity by the Committee this year has headed in divergence from these two earlier bills.

The western governors acid rain principles adopted in 1983 and outlined in previous testimony before the Committee express the governors sensitivity to the environmental damage caused by acid rain, and particularly the potential for problems in western states. They outline the gubernatorial commitment to contributing to a solution but state their opposition to proposals which impose significant direct and indirect costs on western citizens while providing no benefits to them. The principles proposed for adoption within a reauthorization of the CAA are:

1. Cost-effective emission reductions. Legislation should not mandate technological controls or prohibit the use of cleaner fuels to achieve reductions in emissions.

2. Reliance on states to implement reductions. Legislation should provide states the primary role in regulation, allowing them to select any reduction measures they desire.

3. Opposition to nationwide costs. Legislation should not impose costs on all regions of the country without providing some benefits to all regions. In several regions of the country, most notable the West, citizens have already made significant investments in emission controls that should be recognized. Similarly, in any financing scheme credit should be given to non-polluting sources of electricity, such as hydroelectric.

4. Recognition of regional physical differences. Legislation should not impose additional emission reductions in the West without supporting data. Legislation should direct a study of the long-range transport of pollutants in the high and complex terrain of the West, using the results to form the basis for any necessary legislative action.

5. Emissions from new sources should be minimized. Legislation should require the application throughout the country of Best Available Control Technology (BACT) on new sources.

As stated previously, prior legislation reported by the Committee has been generally consistent with these principles and has been publicly supported by the western governors on numerous occasions. The introduction on March 18 of this year of S 2203 marks a major departure from previous years' activities. Because it conflicts with their adopted western principles, S 2203 is opposed by the western governors.

S 2203 would require immediate emission reductions nationwide rather than in the 31 state eastern region identified in previous years' legislation. While the bill does call for the increase in monitoring activities in the West which the governors support, it appears to call for these reductions irrespective of the results of this monitoring. The most problemmatic of the bill's provisions from a western standpoint however is a combination of provisions that would appear to require installation of scrubbers to achieve SO_2 emission requirements. The combination of mandating new source performance requirements on powerplants over 35 years of age with a new 1991 emission standard of 0.7 lbs SO_2/MM BTUs for plants not yet 35 years old essentially means that electric utility companies will be forced to either shut down their older facilities or install scrubbers to keep them operational. The option of switching to lower sulfur coal will be essentially nonexistent because coal resources don't generally exist to meet the 0.7 lbs. standard that would preclude the necessity of scrubbers. Discussions with western mining interests indicate that very little coal being mined today can meet the 0.7 lb. standard without scrubbers. While this coal does lie in the West, the loss of existing higher sulfer coal markets of mines in the region due to the bill's reduction provisions far outweigh the minimal market share increases that might be realized by the few existing mines able to produce coal meeting the standard. These combined provisions make S 2203 neither cost-effective nor flexible in its approach to state regulation of utility emission reductions, and therefore incompatible with established WGA policy.

The western governors suggest that as the Committee begins consideration of acid rain legislation next year that it return to the approach of proposals that have garnered considerable consensus in previous years. Legislation such as S 52, S 2200 and most recently S 2813, all introduced this year, all embody this type of approach. The western governors look forward to working with the Committee as the 100th Congress commences in 1987.

Western Governors' Association Resolution 85-002

August 29, 1985
Honolulu, Hawaii

SPONSOR: Governor Schwinden
SUBJECT: Clean Air Act Reauthorization — Acid Deposition

A. BACKGROUND

1. The western governors have been active in congressional consideration of the reauthorization of the Clean Air Act for several years. The governors have offered constructive suggestions for amendments to the Clean Air Act and have actively lobbied those positions through the western congressional delegations, and congressional committees.

2. In August 1983, the governors adopted a detailed statement on acid rain control legislation which established western principles for legislative action. The policy stated that Congress should adopt an acid rain control program which:

   a. encourages the most cost-effective emission reductions;
   b. relies primarily on states to implement emission reductions;
   c. does not impose nationwide costs while providing only regional benefits;
   d. recognizes regional differences in size and type of emissions, climate, and topography; and
   e. minimizes emissions from new sources through the application of Best Available Control Technology.

3. Action in 1984 by the Senate Environment and Public Works Committee, which is reflected in S 52 introduced this year by Committee Chairman Robert Stafford (R-VT), is generally consistent with that acid rain policy. In the House of Representatives, however, action last year focused on schemes to limit options for reducing sulfur dioxide emissions and for spreading the cost of financing those reductions to all regions of the country. That approach is contrary to the existing policy of western governors, but legislation (HR 2679) has been introduced by Congressmen Morris Udall (D-AZ) and Richard Cheney (R-WY) which reflects the concern for regional equity, cost-effectiveness, and administrative flexibility expressed by western governors.

B. GOVERNORS' POLICY STATEMENT

1. **The Western Governors' Association reaffirms its support for previous policy statements by western governors concerning the reauthorization of the Clean Air Act amendments, including specific recommendations for national acid rain control legislation.**

2. **The Western Governors' Association continues to support congressional action to adopt acid rain control legislation which conforms to the recommendations made by the governors in August 1983. The governors find that the acid rain control provisions included S 52 introduced in the Senate by Senator Stafford and HR 2679, introduced in the House of Representatives by Congressmen Udall and Cheney, are responsive to those recommendations.**

C. GOVERNORS' MANAGEMENT DIRECTIVE

1. **The governors direct that this statement be transmitted to western congressional representatives and other appropriate congressional leaders with an indication of our support for acid rain control legislation which is consistent with established western governors' policy.**

2. **The governors direct that the Western Governors' Association staff continue to lobby the western governors' policies with the Congress and the Administration.**

3. **The governors seek a unified western voice on Clean Air Act issues, including acid rain control legislation, in congressional discussions.**

4. **The WGA will continue to work with other states and regions and other western interests to advance common goals and objectives of WGA clean air policies.**

5. **The governors direct that the Western Governors' Association staff organize a meeting of western governors' staff representatives to develop specific recommendations for amending this resolution, including the development of a western acid rain control strategy.**

DISPOSITION:

Approved: Ariyoshi (HI), Sinner (ND), Bangerter (UT), Bordallo (Guam), Tenorio (NMI), Gardner (WA), Lutali (A.S.), Schwinden (MT), Atiyeh (OR), Evans (ID), Anaya (NM).

Disapproved:

Abstained:

Not Present: Sheffield (AK), Babbitt (AZ), Deukmejian (CA), Lamm (CO), Kerrey (NE), Bryan (NV), Janklow (SD), Herschler (WY).

Western Governors' Association Resolution 84-010

May 22, 1984
Palm Springs, California

SPONSORS: Governors Herschler, Matheson, and Schwinden
SUBJECT: Clean Air Act reauthorization — acid deposition

A. BACKGROUND

1. The western governors have been active in congressional consideration of the reauthorization of the Clean Air Act. Through the Western Governors' Policy Office, the governors have offered constructive suggestions for amendments to the Clean Air Act and have actively lobbied those positions through the National Governors' Association, western congressional delegations, and congressional committees.

2. In August 1983, the governors adopted a detailed statement on acid rain control legislation which established western principles for legislative action. The policy stated that Congress should adopt an acid rain control program which:

   (1) encourages the most cost-effective emission reductions;
   (2) relies primarily on states to implement emission reductions;
   (3) does not impose nationwide costs while providing only regional benefits;
   (4) recognizes regional differences in size and type of emissions, climate, and topography; and
   (5) minimizes emissions from new sources through the application of Best Available Control Technology.

3. Action in 1984 by the Senate Environment and Public Works Committee is generally consistent with that acid rain policy. In the House of Representatives, however, action to date has focused on schemes to limit options for reducing sulfur dioxide emissions and for spreading the cost of financing those reductions to all regions of the country. That approach is contrary to the existing policy of western governors, but legislation has recently been introduced by Congressmen Morris Udall (D-AZ) and Richard Cheney (R-WY) which reflects the concern for regional equity, cost-effectiveness, and administrative flexibility expressed by western governors.

B. GOVERNORS' POLICY STATEMENT

1. The Western Governors' Association reaffirms its support for previous policy statements by western governors concerning the reauthorization of the Clean Air Act amendments, including specific recommendations for national acid rain control legislation.

2. The Western Governors' Association continues to support congressional action to adopt acid rain control legislation which conforms to the recommendations made by the governors in August 1983. The governors find that the acid rain control provisions included in the Clean Air Act amendments reported by the Senate Environment and Public Works Committee and HR 5370, introduced in the House of Representatives by Congressmen Udall and Cheney, are responsive to those recommendations.

3. The Western Governors' Association intends to participate fully in deliberations of acid rain policy within the National Governors' Association. The governors will support NGA policy which is consistent with the principles which have been adopted by the western governors.

C. GOVERNORS' MANAGEMENT DIRECTIVE

1. The governors direct that this statement be transmitted to western congressional representatives and other appropriate congressional leaders with an indication of our support for acid rain control legislation which is consistent with established governors' policy.

2. The governors direct that the Western Governors' Association staff and the Air Quality Steering Committee continue to lobby the western governors' policies with the Congress and the Administration.

3. The governors seek a unified western voice on Clean Air Act issues, including acid rain control legislation, in congressional discussions and deliberations of the National Governors' Association.

4. The WGA staff and the Air Quality Steering Committee will continue to work with other states and regions and other western interests to advance common goals and objectives of WGA clean air policies.

DISPOSITION:

Approved: Governors Herschler, Matheson, Schwinden, Lamm, Sheffield, Janklow, Tencrio, Ariyoshi, Atiyeh, Olson, Anaya, Coleman, Deukmejian, Kerrey, Babbitt

Disapproved: ______________________

Abstained: ______________________

Not Present: Governors Evans, Bordallo, Bryan, Spellman

4. Recognizes regional differences in size and type of emissions, climate, and topography. Congress should not impose additional emission reductions in the West based on date that is limited to existing studies of the East and Midwest. Under current provisions of the Clean Air Act, which the governors support, emission levels of SO_2 and NO_x in the West will decline. In the meantime, Congress should direct EPA to immediately initiate cooperative studies with the states, addressing the long-range transport of pollutants in the high and complex terrain of the western region. Such studies should be completed within four years and should form the basis for any necessary legislative action.

5. Minimizes emissions from new sources throughout the country through the application of Best Available Control Technology and revision of new source performance standards where appropriate.

C. Management Directive

1. Present this statement to the congressional members from WESTPO states and to other appropriate congressional leaders. Present this position in congressional hearings on reauthorization of the Clean Air Act.

2. Present this statement to the President, the Administrator of the Environmental Protection Agency and members of the Cabinet Council on Natural Resources and Environment, requesting that western concerns be considered in the formulation of the Administration's acid rain policy.

3. Staff will conduct an ongoing review and assessment of studies on acid deposition and long range transport of pollutants in the WESTPO states in order to provide the governors and the Air Quality Steering Committee with a more thorough understanding of these processes.

4. The WESTPO staff and the Air Quality Steering Committee will work with other states and other western interests to advance common goals and objectives of this policy.

DISPOSITION:

Approved: New Mexico abstained

Disapproved:

Date of Action: August 20, 1983

WRITTEN STATEMENT OF
EDWARD I. KOCH, MAYOR
NEW YORK CITY
BEFORE THE
SENATE ENVIRONMENT COMMITTEE
SEPTEMBER 26, 1986
Concerning Acid Rain Legislation

Thank you, Mr. Chairman, for the opportunity to comment on acid rain legislation, including S. 2203. Members of this Committee may be aware of the active involvement New York City has had in many environmental issues before Congress in recent years, particularly the Clean Water and Safe Drinking Water Acts. I am here today to state that the issues addressed in S. 2203 are no less vital to the welfare of New York City.

In this and previous acid rain hearings, this Committee has heard from industries, utilities, states, scientists, environmental and other national organizations, but not normally individual cities. If I can leave you with one impression, I would like it to be that cities too, and particularly New York, have a great deal at stake in these debates.

Let me tell you why.

Acid raid is not just an abstract policy debate for New York City. Acid rain threatens to have a very real, very great impact on the lives of City residents, as well as impacts on the City's budget in the hundreds of millions of dollars and more. For this reason, we support any reasonable legislation to reduce acid rain, including S. 2203 and S. 2813.

Specifically, we are concerned about the possible effects of acid rain on our reservoirs. Through the foresight of City leaders in the past, our system of upstate reservoirs now provides a uniquely pristine source of drinking water to the New York metropolitan area. This priceless resource allows us to provide drinking water of superior quality without expensive treatment. Its preservation is a matter of extraordinary importance. For example, we have estimated that filtration for our reservoirs could cost the City over $1 billion in capital costs and another $100 million per year in operating costs.

In order to protect this valuable resource for the future, federal legislation on acid rain is essential. The natural ecological characteristics of our reservoirs make them potentially sensitive to acid rain. We are very concerned that forest decline and weakened vegetation of the kind being detected in many areas of the Northeast could disrupt the ecological balance of our watersheds. Increased acidity could increase leaching of metals from reservoir soils and sediments, require expensive treatment to neutralize the water and lead to more corrosion of City waterpipes, increasing repair costs and releasing dissolved metals into the drinking water itself.

Preserving this resource requires, again, foresight: literally, a willingness to see ahead and act to shape the future. Fortunately, we have detected no deterioration in the City's water supply due to acid rain as yet, but this is no reason to be complacent. An ability to act in the absence of absolute present-day necessity is the essence of foresight. The Committee's previous hearings have brought out the point that the buffering capacity of a particular site can be consumed before acidification in the water supply is detected, but that once the threshold is passed the damage can appear very quickly. We are very much on the side of those who see the need to act in the absence of perfect information. In the meantime, the City has entered into a matching fund agreement with the United States Geological Survey for a $250,000 study to detect the effects of acid precipitation in the Catskills where much of our reservoir system is located.

Second, acid rain is causing real damage right now to the many sandstone, marble and limestone structures in the City, including such well known structures as the Public Library, the U.S. Customs House and the Warburg Museum, all of which have had to receive restoration work. We are not aware of any reliable statistics on damages to property from acid rain nationwide. We might be able to supplement the record on some of these costs which have been incurred in New York if the Committee is interested.

Third, the City's own dedication to clean air has been costly. The City had S02 emissions controls years before national controls where implemented. These include a 0.3 percent fuel sulfur limitation, one of the most stringent in the country. This translates into a $2 to $3 premium for every barrell of oil consumed by Consolidated Edison customers which has resulted in approximately $200 million in higher fuel costs for the City's utility users. Similarly, the City on its own initiative will be installing and operating scrubbers at its planned resource recovery facilities, about $60 million annually for all the plants. (These scrubbers will reduce S02 and NOx emissions below levels contemplated in any pending legislation.)

In accepting this economic burden to protect air quality within and downwind of New York, the City is placed at an economic disadvantaged to some upwind areas which have had less stringent emissions limitations than we do and which, ironically, export significant levels of sulfates and nitrates to the Northeast. New York City has among the highest electrical rates in the country, and we pay the price in competing for industry and jobs. For this reason we favor the "polluter pays" approach in S. 2203 and S. 2813.

Finally, I would like to commend the sponsors of S. 2203 for including strong mobile source controls, particularly those on carbon monoxide. Air deposition and runoff from vehicle emissions is also a threat to our reservoirs, by adding a variety of organic and inorganic compounds as well as acid forming chemicals, and by being implicated in forest decline. In addition, automobile emissions are the primary source of ozone precursors and carbon monoxide in New York City and in other urban environments around the country. Under current law, the State and City have the responsibility to reduce these pollutants to acceptable ambient levels through the SIP, and we are dedicated to that effort. But the single most effective action that can be taken to address this problem is for Congress to require reductions in emissions from the sources of those emissions: motor vehicles.

In this context I would like to conclude with a general comment on pending legislation. We are nearing the end of the 99th Congress and it appears likely that any air pollution legislation will have to wait until at least next year. In this Congress the debate has focussed on acid rain. This in part is because of a stalemate on other issues, and in part based on the perception that acid rain is a special problem. We agree that acid rain is a very important air pollution issue that needs to be specifically addressed. However, in the current climate it is as though every air pollution issue has to be cut to fit the acid rain mold. This a a mistake. For example, it is increasingly clear that if we are to address the issue of forest decline we must look at pollutants other than acid rain precursors, as the sponsors of S. 2203 have done by including mobile source provisions. As Dr. Davis of the National Research Council testified before this Committee in June, what is needed is an integrated approach calling for a general reduction in exposure to pollutants, not just sulfates.

The logic of air pollution requires a broader focus than acid rain, and perhaps the next Congress will be the time for such legislation. New York City, because of the many concerns discussed above, has a great stake in the outcome and would like to participate in this process.

STATEMENT OF THE
AMERICAN GAS ASSOCIATION
BEFORE THE
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
UNITED STATES SENATE
ON ACID DEPOSITION REDUCTION
S. 2200, S. 2203 and S. 2813

October 2, 1986

The American Gas Association (A.G.A.) is pleased to submit its views on the Senate proposals for reducing acid deposition (acid rain): S. 2200, introduced by Sen. George Mitchell (D-ME); S. 2203, introduced by Sen. Robert Stafford (R-VT); and S. 2813, introduced by Sen. William Proxmire (D-WI). A.G.A. is a national trade association comprising nearly 300 natural gas distribution and transmission companies. Together, these companies serve nearly 85 percent of all gas utility customers and account for more than 80 percent of gas end use sales.

STATEMENT OF POSITION

Natural gas is the cleanest burning fossil fuel. It emits virtually no sulfur oxides (SOx) or particulate matter, and fewer nitrogen oxides (NOx) than any other fossil fuel. Thus, burning natural gas in place of coal or oil can reduce SOx emissions dramatically. Furthermore, gas can be burned with less environmentally attractive fuels, such as coal or oil, to reduce SOx and NOx levels. Thus, natural gas can play an important role in reducing SOx and NOx emissions that are believed to cause acid rain.

Since acid rain prevention and environmental protection are now major public policy goals, all environmental compliance options must be analyzed to determine the most cost effective methods for reducing SOx and NOx emissions. Acid rain control proponents often focus only on coal cleaning through flue gas desulfurization (scrubbing) as the primary means of reducing SOx levels. However, natural gas utilization technologies represent some of the most cost effective and efficient environmental compliance alternatives. Thus, for any acid rain control proposal to be effective, it should not dictate the method of compliance and should, instead, give plant operators sufficient flexibility to choose the most cost-effective compliance alternative for their sites.

Congress can take several steps right now that would help reduce SOx and NOx emissions: it can repeal existing legislation that places uneconomic prohibitions on natural gas use in some Department of Defense Appropriations bills;[1] in the incremental pricing

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1/ Since these restrictions force U.S. military facilities to use more polluting fuels, they will make it much more difficult for individual states to achieve SOx and NOx reductions. A recent National Defense Council Foundation Report, entitled Congressionally Mandated Energy Waste at the Department of Defense (February 24, 1986) found that special interest legislation is forcing the Department of Defense to use coal or oil in many facilities despite cheaper energy alternatives. Over time, these restrictions will cost the American people from $2.1 billion to as much as $5 billion.

provisions of the Natural Gas Policy Act;[2/] and in the Powerplant and Industrial Fuel Use Act (FUA).[3/] We urge you to support the repeal of these restrictions on natural gas consumption.

NEW TECHNOLOGIES
Using Natural Gas For Cleaner Coal And High-Efficiency Power Generation

There are many different clean air technologies; some of them use mechanical systems to remove pollutants while others use clean burning natural gas. The natural gas

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2/ Incremental pricing (15 U.S.C. §§3301 et seq.) requires industrial boiler owners to pay a surcharge for their natural gas. Although this surcharge was originally intended to shield residential gas consumers from higher prices, actually it hurts all consumers because it makes natural gas non-competitive with high sulfur residual oil in some regions of the country. This not only causes load loss and higher residential gas rates, but also has a detrimental effect on air quality.

3/ FUA (42 U.S.C. §§8301 et seq.) is a particularly wasteful and environmentally detrimental statute which prohibits the construction of new natural gas-fired large industrial boilers or electric power plants. It even prohibits the construction of combined-cycle power plants, one of the cheapest and most energy efficient ways to generate electricity. A research paper by the Urban Institute, entitled Regulatory Restraints on Natural Gas Use: The Logic Is Lacking (October 1985), estimates that by restricting plant operators to coal, FUA will result in substantial additional pollution: 2 billion pounds of SOx between now and the year 2000, plus 600 million pounds of NOx, and over 100 billion pounds of extra sludge and ash that must be safely disposed of. The Urban Institute said that repealing FUA would "reduce the annual cost of producing electricity and energy-intensive industrial goods by $1.65 billion (measured in constant 1985 dollars). The present value of the savings between 1986 and 2000 would be about $5 billion."

technologies include:

(1) for existing facilities, the select use of gas to offset emissions from coal or high sulfur oil;

(2) for new facilities, low emitting cogeneration and combined cycle units that will reduce the rate of increase in pollution from new facilities; and,

(3) for new and existing facilities, reburn technology which reduces NOx emissions from coal.

(1) Select Gas Use

"Select Use" is a relatively new but well proven combustion technique: burning natural gas with less environmentally attractive fuels in the same or a separate boiler for environmental purposes. Gas can be used with Eastern high sulfur or Western low sulfur coal and with residual fuel oil. In one option, gas may be burned in a fuel mixture, usually with coal, in the same unit. Alternatively, gas and the other fuel are burned in different units; then the lower gas emissions are averaged with the higher emissions from coal or oil. Similar applications, called "bubbles" when approved by the Environmental Protection Agency, would be particularly useful and cost-effective in reducing SOx emissions.

Converting just a few facilities in a given state to SOx-free natural gas could save the costs of installing scrubbers on numerous plants throughout the State. For example, the state of Wisconsin recently enacted acid rain legislation which focuses on the 43 largest emitters of SO_2 in the State. Of these sites, at least 16 are already hooked up to gas and could use gas to reduce SO_2 emissions immediately by 50 percent, for a total statewide reduction of 134,000 tons of SO_2/year.

Select use technology has already advanced from the theoretical to the actual. Many select use applications have been approved by EPA and implemented. About one-third of them, to date, involve the use of natural gas. As an example, the St. Joseph Resources zinc plant in Palter Township, Pennsylvania, will begin co-firing gas with coal in 1987 to meet its sulfur emission limits under an EPA consent decree. Some of the advantages of select use are that:

- Plant Operators Could Realize Lower Costs. Using natural gas to offset SOx emissions from coal units tends to have low capital requirements. In many cases, this strategy has the lowest total costs of any control option. The costs of SO_2 reductions by using natural gas with coal have been calculated to vary from a very low \$50/ton of SO_2 reduced to over \$1000/ton, with many applications in the \$200-\$400/ton range. By comparison ICF, Inc., an independent consultant, estimates a range of costs, from \$250 to \$2000/ton of SO_2 removed, for seven straight coal alternatives. Thus, natural gas/coal strategies are at the low end of the cost curve.

- Natural Gas Lowers Many Pollutants Simultaneously. Natural gas use simultaneously reduces many pollutants (e.g., sulfur oxides, nitrogen oxides, reactive hydrocarbons, particulates, carbon monoxide, carbon dioxide). It produces virtually no SO_2 or particulate matter, about one-third as much NOx as coal, and one-half as much NOx as high sulfur residual oil. In addition, gas combustion produces no sludge or ash, in sharp contrast to the scrubbers and precipitators that are used to control emissions from coal.

- Natural Gas Can Increase the Use of Local Coal. Several of the current acid rain proposals have SO_2 emission limits that may be difficult and expensive to meet for units that burn high sulfur coal. One option is to employ a technique known as coal washing to partially reduce SO_2 emissions from the coal and then burn it with gas in a 30:70 gas:coal ratio. This technique reduces SO_2 emissions by two-thirds and preserves 70 percent of the market for high sulfur coal.

- Natural Gas Has Operating Advantages. Natural gas ameliorates operating problems caused by other control measures. For example, switching to low sulfur coal may cause substantial unit derating, while also increasing particulate emissions and solid waste disposal problems.

- Natural Gas Use Should Be Increased. Shortly after the NGPA was enacted, a natural gas deliverability surplus, or "bubble," developed in the United States. To the great surprise of many, this "bubble" grew rapidly and has persisted. Lower natural gas demand, coupled with supply stability, has led to 2.5 trillion cubic feet (Tcf) of shut-in U.S. gas. Furthermore, U.S. buyers have contracted for 1 Tcf of Canadian gas which they cannot take. This domestic and Canadian surplus has led to hardship among gas producers and to higher consumer prices because of take-or-pay prepayments for shut-in gas. The principal solution to both the take-or-pay problem and the decline in producer exploration is to sell more gas. More gas demand will alleviate take-or-pay for gas buyers and cause a "demand pull" for gas sellers that will put them back in the business of drilling for new supplies.

- Natural Gas Has Supply Security. Natural gas can displace foreign oil. For example, switching twelve New England power plants from oil to either natural gas or a gas/coal mix could reduce the region's use of imported oil by 15 percent, while improving the U.S. balance of payments.

- Natural Gas Use Creates Quick Sulfur Oxide Reductions. Most large oil burning units already have gas burning capability. Thus, substituting natural gas for high sulfur residual oil can reduce acid rain immediately, whereas other technologies require many years for equipment design, testing, and installation. For example, switching a large (750 megawatt) power plant from high sulfur oil to natural gas could reduce SO_2 emissions by 34,000 tons/year. As we mentioned above, this strategy has the added national security advantage of reducing imported oil demand by 7 million barrels/year.

(2) Gas Fired Combined Cycle and Cogeneration Units

States need not sacrifice economic growth to meet tougher emissions targets. New combined cycle and cogeneration plants can reduce the growth in the emissions inventory. A study by the Office of Technology Assessment, entitled "Acid Rain and Transported Air Pollutants: Implications for Public Policy" (June, 1984), predicts that total SO_2 emissions will increase by about .5 million tons to as much as 3.5 million tons by 2000, while NO_2 emissions will increase by as much as 5 million tons. This rate of increase could force states to require expensive retrofits for existing units and/or curtail growth from new construction. However, significantly lower emissions from combined cycle and cogeneration units make it possible to build new plants even with tougher emission standards.

Gas fired combined cycle and cogeneration units are two highly efficient and inherently low polluting ways to generate electricity. In a combined cycle unit, the waste heat from a gas or oil turbine is recaptured and used to produce more electricity with a steam turbine. A cogeneration unit also produces electricity, but the waste heat is used on site in an industrial process. In either case, fuel, capital, and environmental costs are lower than for conventional coal-fired power plants. For example:

> A 240 MW electric power plant that uses 2 percent sulfur coal with a 10 percent ash content would produce 4000 tons of SO_2 annually and 200 tons of particulates, even with scrubbers and electrostatic precipitators. In contrast, the SO_2 and particulate emissions from a combined cycle unit are negligible

> (less than 0.3 percent of the coal unit) while NOx emissions are about half the coal unit's emissions. Cogeneration units have similar performance characteristics.

Unfortunately, the Fuel Use Act prohibits the construction of new gas-fired combined cycle and cogeneration units unless the owner first gets an exemption from the Department of Energy.4/ FUA and the other restraints on gas use force plant operators to turn to coal for new plants, even though natural gas units may be less expensive to build, easier to operate, and inherently less polluting than coal-fired units built with state-of-the-art control technology.

(3) Reburn Technology

Reburn technology is a NOx control method for coal-fired electric utility or industrial boilers, that plant operators can use on new or existing coal units to meet tougher NOx reduction standards. Again, FUA and the other demand restraints impede the use of this cost-effective technique.

In the reburn process, natural gas (or another fuel) is injected into the exhaust from a coal-fired boiler, creating a fuel-rich zone in which the NOx reacts and produces free nitrogen; air is then added to complete the combustion

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4/ Even though the Department of Energy issues FUA exemptions, that process is so slow and expensive that many companies may be dissuaded from even applying. According to an A.G.A. survey of the exemption process, it takes from 6 months to 1 year for an exemption plus legal fees that may approach $100,000. Right now, the exemption process is delaying the sale of 225 billion cubic feet of gas, worth about $700 million/year in wellhead sales.

process. Because the gas is injected into the boiler before the heat exchanger, its energy is also used to generate steam. Preliminary testing indicates that gas reburn technology could reduce NO_2 emissions by 50 to 60 percent.

The Gas Research Institute (G.R.I.) has funded research by the Energy and Environmental Research Corporation that has shown that the technology works and that natural gas injection produces the largest NOx reductions. G.R.I. is currently planning to demonstrate this technology by retrofitting and testing an actual utility boiler.

CONCLUSION

Increased natural gas use by electric utilities and industrial energy users would result in substantial reductions in sulfur and other emissions. Thus, the option of using gas should not be foreclosed.

We note that any acid rain or sulfur reduction legislation should not mandate a single control technology. Instead, such legislation should permit plant operators to choose the most cost-effective method to meet any of the sulfur and nitrogen oxide reduction targets contained in the Senate bills. Because the most efficient control strategy for a particular plant depends on factors at that plant, it makes sense to let the plant operator choose the control strategy that best fits these factors. It also makes sense to repeal restrictions on natural gas use in FUA, in some DOD appropriations, and in incremental pricing. A energy program should include repealing all restraints on natural gas use.

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John A. Knebel
President

STATEMENT OF

John A. Knebel, President

American Mining Congress

Before

The United States Senate

Committee on Environment & Public Works

Hearing on

S. 2203 ("The New Clean Air Act"),

S. 2200 ("The Acid Deposition Control Act")

and

S. 2813 ("The Acid Rain and Sulfur Emissions Reduction Act")

October 2, 1986

AMERICAN MINING CONGRESS
International
MINING SHOW
Las Vegas, Nevada
October 5–9, 1986

STATEMENT OF

JOHN A. KNEBEL, PRESIDENT

AMERICAN MINING CONGRESS

OCTOBER 2, 1986

The American Mining Congress (AMC) is a broad-based trade association with more than 400 members located throughout the United States. AMC represents the nation's mining and minerals processing industries--including producers of coal; nonferrous and precious metals, agricultural and industrial minerals; cement and uranium. It also represents manufacturers of mining equipment, as well as financial entities and engineering firms that serve the mining industry.

AMC appreciates this opportunity to express its views on acid rain legislation now being considered by this Committee, in particular S. 2203, "the New Clean Air Act." In our view, S. 2203 and the other acid rain bills now before Congress--including S. 2200 ("the Acid Deposition Control Act"), S. 2813 ("the Acid Rain and Sulfur Emissions Reduction Act") and H.R. 4567 ("the Acid Deposition Control Act of 1986")--are premature and unjustified.

AMC believes that it would be inappropriate to require expenditures of billions of dollars annually, as these bills would, without a clearer understanding of the issue than presently exists.

When referring to the need for a clearer understanding of the issue, we are not speaking of the scientific issue--although there are outstanding questions of science. We are raising a broader and more fundamental policy issue that needs to be addressed openly and rationally in the context of these legislative proposals on acid rain.

Acid rain legislation transcends environmental issues and is a statement of national industrial policy.

We all know that legislation controlling acid rain will result in significant added expenditures to American industry--including substantial new costs for emissions control and process changes and an increase in the delivered price of electricity.

Electricity--the life blood of American society--is an important component in the price of all goods, including mineral products. Accordingly, acid rain legislation will have profound consequences in terms of economic growth, industrial competitiveness and international trade.

Certain economic impacts of these bills have been estimated. For example, the Office of Technology Assessment has estimated the costs of S. 2203 at $6 billion annually for the power plant provisions alone.

However, the costs that really count--namely, those that affect the prices of goods, our international competitiveness and the wallet of every American--have not been examined sufficiently.

Failure to consider S. 2203 and other acid rain proposals from this broader perspective of national industrial policy will result in the export of industrial operations and jobs--a further erosion of our mining, manufacturing and employment base and ultimately a lowering of our standard of living.

In this nation, we have a standard of living unmatched anywhere in the world. For the most part, we are well-fed, well-housed and well-clothed. However, we have gone beyond providing the necessities of life. Goods and services recognized by world standards as luxuries are within the reach of most individuals in our society. Many of these luxuries, I might add, are products of mining, either directly or indirectly.

This enviable position has resulted from our ability to take resources provided to us and create wealth from them. We in the mining industry are proud of our key role in this accomplishment. Admittedly, there have been some environmental disruptions, but an industrial and technologically advanced society cannot exist without some effects on the environment and some risk to public health.

Since 1970, our society also has undergone fundamental economic change. When the Clean Air Act was enacted, there were effectively two markets: the United States and the rest of the world. Increasingly, in the last quarter century, this has changed to a single, global economy. American industry, including the mining industry, now must compete more vigorously than ever before both at home and abroad.

AMC supports this development. It assures that American consumers will buy products at the best possible price. However, in formulating public policy on environmental and other issues for our basic industries, this new economic reality must be taken into account. Contrary to the assumptions of some in our society, we cannot prosper as a nation relying on service industries alone.

AMC also fully agrees that our mining and manufacturing operations must be conducted responsibly to protect the environment and to minimize risks of significant harm to public health. However, there are other values that are equally as important as environmental protection, including productive jobs for our citizens.

Since 1980, the mining industry has undergone a major restructuring in an effort to become more competitive. Employment in metal and nonmetal mining has declined 43 and 15 percent, respectively. Last year, imports of nonfuel minerals exceeded exports by $17 billion, an 89 percent increase over 1981. If mining and manufacturing industries are to meet the challenge of foreign competition, we must keep costs to a minimum.

AMC believes that the acid rain bills now being considered by your committee ignore today's economic realities. Environmental legislation, including the acid rain bills, simply cannot be viewed narrowly, given the existence of a single global and highly competitive marketplace. Today, the old assumption that American industry can pass the costs of domestic environmental requirements to consumers no longer prevails. It is in this context that we oppose the enactment of any acid rain legislation at this time.

The Congress needs to know the full array of effects of such legislation--including the effects on our competitiveness and balance of trade. Estimating such costs will not be an easy task. Nonetheless, it must be done to the best of our ability, if we are to have a reasonable chance to retain our mining and manufacturing industries as vital segments of our economy.

In view of the real and substantial consequences of acid rain legislation on the nation's industrial and employment base, we also need to be as sure as reasonably possible that there is a problem requiring such legislation.

To date, however, a scientifically supportable case has not been made for acid rain legislation. To proceed without first establishing a causal connection between coal combustion and acid rain, in our opinion, would be imprudent. Certainly, this was the judgment of the 96th Congress when it enacted the Acid Precipitation Act of 1980, which established a comprehensive 10-year federal research program to identify the causes and effects of acid rain and actions to limit any harmful effects of this phenomenon. Nothing has changed since 1980 that requires action now prior to completion of that program, which will be finished in the next few years.

While we await the development of data on the economic consequences of proposed legislation and completion of the on-going federal research program, the question of sulfur dioxide emissions is not being neglected. Under the existing Clean Air Act, regulatory programs to control sulfur dioxide have been in place for more than a decade; these programs are working. Emissions have been reduced significantly. Between 1973 and 1983, sulfur dioxide emissions declined by 28 percent. Indeed, utilities reduced emissions by 19 percent, while increasing coal utilization by 60 percent.

Since 1970, nonferrous smelters have reduced sulfur dioxide emissions by 75 percent according to the General Accounting Office. Although part of the decline in smelter emissions may be attributed to facility closures, an important part--about 44 percent--was achieved through installation of expensive control equipment and innovative process technology.

Moreover, the issue of sulfur dioxide emissions is being addressed by research and demonstration programs financed by federal, state and private entities to develop clean coal combustion technologies. Such technologies hold the promise of significant sulfur removal. For example, Consolidation Coal Company--a member of AMC--is pursuing boiler limestone injection, a process in which pulverized limestone is injected directly into the combustion area of a coal-fired boiler. Consol has conducted a successful demonstration project at a plant with boilers comparable to those of a large utility. More than 50 percent reduction in sulfur dioxide was achieved with no loss of efficiency. In addition, clean coal technology offers numerous other advantages, including less solid waste and less overall cost. Thus, the benefits from new technology will be positive both environmentally and economically--in short, a situation where all of society are winners.

Current legislative proposals--including S. 2203--that require immediate emission reductions would hinder the commercialization of such promising technologies. We believe that this circumstance alone weighs heavily in favor of a deferral of congressional action now and in the immediate future.

In conclusion, we recognize that the recent decline in America's basic industries, including mining, cannot be ascribed solely to environmental laws, and we are not requesting their repeal or removal. Nor do we oppose additional environmental programs where a need is demonstrated and where the nation can afford them. Rather, we urge the Congress to give due consideration to the Nation's economic needs as it debates legislation in this vital area. For the good of the country, we need a new cooperative approach on the part of industry, government and environmentalists--and the place for it to start is on the issue of acid rain.

AIA

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*Executive Committee

June 26, 1986

The Honorable Robert T. Stafford
Chairman
Committee on Environment and Public Works
United States Senate
SD-410
Dirksen Senate Office Building
Washington, D.C. 20510

Dear Mr. Chairman:

This communication serves to introduce the Auto Internacional Association, and offer comments on S.2203, the "New Clean Air Act."

The AIA membership is made up of purveyors of parts and accessories for imported motor vehicles, both imported and domestically produced products.

We have reviewed the provisions of S.2203, and hereby offer observations which we believe to be worthy of consideration. Our comments address the proposed emission standards; the 10-year/100,000-mile warranty; and the I/M emission components inspection.

EMISSION STANDARDS:

Current passsenger-car emission standards have yielded substantial reductions in vehicular emissions; any efforts to further reduce emission levels would not, in our opinion, be cost-effective when compared with the results to be achieved. Current emissions control technology provides for emission levels significantly lower than the standards, with good fuel economy and excellent driveability maintained. Were attempts made to further reduce emissions, a degradation of both fuel economy and driveability would result, leading to more tampering, an activity now at an alarming rate; realizing, as we must, that one tampered vehicle is capable of emitting emission levels equivalent of 50 or more vehicles operating at certification values.

For the sake of clean air, it is our belief investment expenditures by manufacturers to advance technology to meet the proposed standards of S.2203 are better directed toward assuring that the vehicles produced today maintain their certification levels throughout the useful life of the vehicle. Studies conducted by the California Air Resources Board (ARB) reveal significant samples of vehicles in non-compliance at as few as 15,000 miles, even after excluding those which are improperly maintained or subjects of tampering.

AUTO INTERNACIONAL ASSOCIATION
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It is clear the problem is not that the emission standards are not sufficiently strict; rather that the emission-control systems do not incorporate sufficient durability to maintain the current standards. Increasing the stringency of the standards will cause the expenditure of funds for what we deem to be the wrong solution, and will unnecessarily increase the burden on the automotive aftermarket parts producers and vendors and their ability to comply with emission regulations.

10-YEAR/100,000-MILE WARRANTY

Durability is indeed the issue, yet it has been demonstrated that warranties do not encourage manufacturers to build in durability. It has been argued that the vehicle manufacturers need to be prodded into building durably clean cars, but there is no evidence that warranty itself forces manufacturers to build cars to satisfy clean air demands. We refer to remarks by former ARB Chairwoman Mary Nichols, who stated the same conclusion at ARB hearings in May 1981 when she rejected a staff proposal to extend the warranty period to 7 years and 75,000 miles, stating that, "The warranty has not been the way to get more new car durability, nor," she added, "is extending it going to solve the problem."

Vehicle durability is achieved at the design and production levels, evidence EPA's requirement that prototype vehicles undergo a 50,000-mile durability test prior to volume manufacture. Although production vehicles are subjected to random assembly line tests, in actual use the vehicles still fail to comply at very low mileage, as indicated.

In fact warranty has been little more than a marketing tool among manufacturers, with minimal or no concern over any potential liability the warranty might pose. This became evident after the ARB reduced the 5-year/50,000-mile warranty on certain tune-up parts to a period of 2 years/24,000 miles. All but one manufacturer said they would continue to offer a 5-year/50,000-mile warranty. In all probability, this decision is based on the conclusion that there is a limited degree of exposure to a manufacturer as a result of warranty claims.

A natural bias favoring the manufacturers manifests when unchallenged decisions rest in the hands of the vehicle manufacturers through their dealers: A powerful financial incentive exists to deny a warranty claim, since the consumer has paid for the warranty at the time of vehicle purchase and comparatively few warranty claims are ever undertaken.

Citing a survey by the Automobile Club of Southern California: The organization's poll revealed that fewer than one percent of the cars tested in the I/M program received free repairs under warranty, but 22 percent actually qualified for such repairs. This evidence is certainly contrary to those who would argue that a warranty is a "free" benefit to the consumer and not a windfall to the manufacturer.

In March 1977, the Chief of the Antitrust Division of the U.S. Justice Department identified warranties as nothing more than "...a service contract, the direct costs of which are included in the initial vehicle price."

We argue that warranties offer no inducement to greater durability and provide insignificant air quality benefits. While there is so little advantage to the extended warranty, it would have an adverse impact on the automotive aftermarket, allowing manufacturers to continue their monopoly of parts and service for 10 years or 100,000 miles instead of 5 years or 50,000 miles.

The practial end result is to send business to new vehicle dealers, customers they have been unable to attract through competition. A 1981 report prepared by Booz, Allen & Hamilton, Inc., found that consumers were significantly less satisfied with dealer repair work than with work done by any other type of repair facility; the same study revealed that, in a free marketplace, dealers experience the lowest rate of repeat business. The warranty, a proven traffic builder, is a tool which aids in counteracting this free-market pattern. Were this not true, dealers and manufacturers would be lined up with the aftermarket parts and service industries complaining to the Congress that the warranty has caused a severe burden.

I/M EMISSION COMPONENT INSPECTION

Auto Internacional Association agrees with the necessity for inspection and maintenance programs. It is the only method by which to control in-use vehicle emissions and to encourage emisssion-warranty use. Although I/M programs are said to be an effective method of controlling in-use vehicle emissions, the EPA has nonetheless suggested increases in ozone and oxides of nitrogen. Various reasons have surfaced for this:

> The programs are poorly managed;
> Enforcement of the program is not sufficient;
> Emission cut-points are not low enough;
> Repair cost limits are too low to allow for sufficient repair; and
> There are high levels of tampering.

Ongoing EPA motor vehicle tampering surveys indicate disquieting rates of tampering; the overall rate for 1984 was 26 percent, when the data is weighted for the proportion of the national vehicle fleet covered by I/M-only programs and I/m plus anti-tampering programs (ATP). The tampering rate for areas without an I/M program was 31 percent, while the rates for I/M-only and I/M plus ATP areas were 17 percent and 11 percent respectively.

There is obviously a clear need for not only I/M programs, but I/M plus ATP programs. However, we would caution against the implementation of an anti-tampering program which embraces components other than those which have as their primary function the control of emissions. The components for inspection in this case should be limited to:

The catalytic converter;
Fuel inlet restrictor;
Air injection systems;
Exhaust gas recirculation valve;
Positive crankcase ventilation valve; and
Evaporative emission controls.

The foregoing are the parts recommended for inspection by the EPA.

To extend inspection beyond those parts principally related to emissions control is to invite a level of complexity which foretells deterioration of the potential effectiveness of the program before it begins. In California. for example, the field inspectors have been required to look at all engine parts to determine whether they are original equipment or aftermarket; if aftermarket, the parts must be checked against catalogs or ARB lists to ensure use of an approved part. In placing such a questionable, time-consuming requirement on the service industry, some of the more critical emission control devices are being overlooked.

In an evaluation study of the California I/M program, Radian Corporation reported that field inspectors only identified the following percentages of tampering:

Catalytic converters	43%
Air injection systems	59%
Evaporative controls	29%
Fuel intake restrictor	13%
PCV	24%
EGR	22%

It is our belief that if field inspectors were required to identify and inspect only those parts which are directly related to emission control, the program would be more effective as it relates to ambient air quality benefits.

EMISSION RECALL:

As indicated, it seems abundantly clear that the most effective means of ensuring improvements in air quality is through durability of the emission control systems. And the most effective means of achieving that level of durability is through enforcement of an effective product-recall program. The potential liability impact and attending costs of a large recall will no doubt result in a substantive economic incentive to produce reliable and durable systems.

While the cost to vehicle manufacturers of warranty repairs carries a far smaller price tag because of limited car-by-car exposure, the threat of a multi-model engine family recall imposes a far heavier burden, one not subject to the judgment calls of new-vehicle dealers. Recall encourages a greater impact on national ambient air quality.

Most importantly, conducting recalls does not impose an anti-competitive impact on the aftermarket parts and service industries, as in the case of warranties by an unfair binding of the motorist to the vehicle dealer. Unlike warranties, recalls provide a true consumer benefit. When a recall notice is received, the consumer/car owner knows exactly that which must be repaired or replaced. To ensure that the consumer fulfills his obligation to have the required repairs completed under the emission recall, a list of such recalls could be furnished to State DMVs for flagging and enforcement at the time of vehicle re-registration.

AIA recommends that the Committee direct its attention and energies to a program which increases emission control durability, enforced by an effective recall program.

CONCLUSION:

AIA will be in support of a position which achieve the following:

No adjustments to light-duty vehicle emission standards;
A 2-year/24,000-mile emissions warranty;
Anti-tampering inspections of primary emission control devices; and
Extended recall.

We appreciate the opportunity to offer our views to the Committee, and will be pleased to provide additional information which will be of value to the Committee as the review of this important legislation is pursued.

Sincerely,

Dick Wells
National Director

DW/sb

**Automotive
Service
Councils, Inc.**

**Effective July 21, 1986, ASC has become
Automotive Service Association (ASA).**

DIRECT REPLY TO:
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September 19, 1986

The Honorable Robert T. Stafford
Chairman, Committee on Environment
and Public Works
410 Dirksen Senate Office Bldg.
Washington, DC 205210

Re: Acid Rain Bill, S. 2203

Dear Senator Stafford:

Automotive Service Association (ASA) is the largest national association representing independent automobile repair shops. As Congress considers legislation which would amend the Clean Air Act to address the acid rain problem, ASA urges Congress to thoughtfully act to alleviate the anticompetitive effect mandatory 5-year/50,000 mile vehicle emission warranties have had on the automobile repair industry. Any extension of the emission warranty program by extending the length of the warranty period would only exacerbate existing economic distortions caused by the anticompetitive effect of this program.

Although a well-intentioned provision in the Clean Air Act, mandatory vehicle emission warranties have evolved into a legal requirement which discriminates against small businesses, stiffles competition in the market place, and denies American consumers the choice where to have emission warranty work performed.

First, all warranty work executed pursuant to vehicle emission warranties must be performed by automobile dealerships. Independent repair shops, which are predominantly small businesses, are excluded from performing emission system warranty repairs. Although independents may perform routine maintenance, they may not perform warranty repairs and be reimbursed by the manufacturer. The net effect of this economic discrimination is more significant than lost patronage from emission system repairs. Once consumers enter automobile dealerships to execute their vehicle's emission system warranty, they most frequently leave the dealership having had a variety of additional non-related repair work completed for which they must pay the dealer. Mandatory emission warranties divert a significant amount of business within the first 5 years and/or 50,000 miles of a new vehicle's life away from small independent repair shops and to big business dealerships.

Second, mandatory emission warranties stiffle competition in the auto repair industry. In spite of the fact that many independent repair shops can and do perform high quality emission system repairs, these establishments cannot compete for warranty repairs. In addition to providing dealerships with a captive market, emission warranties effectively eliminate the quality check which competition in the marketplace provides. Additionally, it locks the dealers to the manufacturer for replacement parts and therefore, dampens competition from independent parts manufacturers.

Third, consumers must purchase emission warranties yet they are frequently poorly informed about the existence of or scope of such warranties. Further, consumers cannot choose an independent repair shop to perform warranty repairs since they are required by federal law to purchase this warranty.

The present 5-year/50,000 mile warranty period fails to adequately consider the adverse economic ramifications such a mandatory program has on competition in the automobile repair industry. Working with Representatives Dannemeyer and Bates, ASA has urged Congress to rollback the emission warranty period to 2 years/24,000 miles and to permit independent repair shops to perform emission warranty repairs.

As you consider pending proposals which would amend the Clean Air Act, ASA urges you to oppose any effort to lengthen the term of emission warranties. Additionally, we urge you to favorably consider reducing the warranty period to a more reasonable term of 2 years/24,000 miles and permitting independent small business repair shops to compete for emission warranty repair work.

Best Wishes.

Sincerely,

Don Randall

Donald A. Randall

DAR/fg

STATEMENT OF JOHN W. NERLINGER
PRESIDENT, AUTOMOTIVE SERVICE INDUSTRY ASSOCIATION
TO
SENATE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

RELATING TO THE EMISSION WARRANTY PROVISIONS OF S.2203, THE ACID RAIN CONTROL BILL

Mr. Chairman, members of the Committee:

My name is John W. Nerlinger. I am president of Automotive Service Industry Association (ASIA), the organization representing the entire automotive aftermarket industry. The association appreciates this opportunity to present its views with respect to the emission warranty provisions of S.2203, the Acid Rain Control Bill.

The Automotive Service Industry Association (ASIA) is the automotive world's largest and most comprehensive organization. Its membership encompasses more than 8,500 independent automotive wholesalers, warehouse distributors, heavy-duty parts and equipment distributors, automotive electric service distributors, manufacturers' representatives, manufacturers and remanufacturers of automotive parts, tools, equipment, chemicals, paint, refinishing materials, supplies and accessories. Members of the association are primarily small businesses engaged in manufacturing and distributing the replacement parts and accessories that are required to service and repair the millions of passenger cars and trucks in operation in the United States today.

The parts and components necessary for the repair and maintenance of these millions of motor vehicles are primarily supplied by independent manufacturers and distributors, which are collectively known as the independent aftermarket industry. This parts and service industry, composed of over 400,000 independent businesses, the vast majority of which are small businesses, occupies a vital role in maintaining the nation's vehicles and in protecting the environment.

Mr. Chairman, you and the members of the Committee are to be commended for your unrelenting and tireless efforts to protect and to preserve our environment. The independent automotive aftermarket also places a high priority on such protection. Over the years, the independent aftermarket has made a significant contribution to the protection and preservation of the environment by providing a convenient, efficient and low cost opportunity to make the necessary repairs and to perform the necessary maintenance on the millions of motor vehicles traveling the nation's highways. The consumer has overwhelmingly chosen to use the independent aftermarket where a free choice to do so has presented itself. The result is that our air quality is better than it would be if they did not so freely exercise their choice for that efficient and convenient service.

Getting the right parts to the right person at the right time and at the right place at a competitive and affordable price is the mission of the independent aftermarket. It is a mission that serves the consumer very well. Competition in the marketplace breeds efficiency and that efficiency allows the industry to provide the double convenience of affordable cost and immediate service.

Now however, the consumer and this vast independent industry face a serious crisis. The competitive structure of the industry and therefore the highly efficient and affordable service it provides is under attack. The point of attack originates from a highly unexpected source.

It is one that is self-defeating and highly destructive. We refer to the monopolistic long-term performance warranty interpreted by the EPA to cover a wide range of parts, a warranty that is being accepted by the vehicle manufacturers as a fact of life that imposes few additional economic burdens on them but as one which opens up new vistas of a government mandated and approved monopoly in an industry that has heretofore successfully served the public so well primarily because of competition and the absence of any such monopoly.

The issue raised by the long-term performance warranty is not environmental --- it is an economic issue --- it is a question of monopoly as opposed to free enterprise. It is an issue that springs from the language of the Clean Air Act and the EPA interpretation of that language.

In 1977 Congress attempted to strike a careful balance between the environmental benefits and the anticompetitive drawbacks of a mandated long-term warranty by amendment to the Clean Air Act. While recognizing that any mandated warranty destorts the marketplace and deprives the consumer of freedom of choice in selection of parts and services, the independent aftermarket nevertheless was prepared to live with a reduced warranty since it more closely conformed to the actual economic realities of the marketplace exercised on a voluntary basis by the industry.

It is submitted that such a mandated warranty was not and is not needed in order to protect the environment. The requirements for protection of the environment are met by maintaining in the Act the provisions for durability certification through mandatory recall provisions. Thus, the mandate of a warranty takes on the character of an imposition of economic control that is not related to or necessary for the attainment of desired clean air objectives.

The existence of a warranty has historically forced the vehicle owner back to the vehicle dealer, not only for warranty work but also for routine maintenance work, such as spark plug replacement. It is only human nature to refuse to risk the loss of something of potential value that has been paid for in the original price of the vehicle.

Studies conducted in the 1960's, during the time vehicle manufacturers initiated voluntary 5 year/50,000 mile warranties, showed a significant drop in the independent aftermarket share of the replacement market even for those parts and services that were not specifically covered by the extended warranties.

The question of an environmental need (as opposed to an economic objective) for a warranty must be addressed. In its own studies, the EPA has found that most vehicles failing an emissions test do so because of improper maintenance, removal of components by the owner or use of leaded gasoline. In the vast majority of cases, therefore, the system does not come under the terms of a performance warranty. What then can be accomplished by imposition of a requirement for a warranty offering that does so little for the environment but is so economically devastating to the aftermarket and to the consuming public?

Such a devastating impact on consumer choice and on an important and highly competitive industry is significantly exacerbated by any increase in the coverage of such a mandated warranty. The requirement, found in S.2203, that all new vehicles must have a warranty of emissions for 10 years or 100,000 miles, does not provide any effective tools necessary to address the problem of transported air pollutants, but the requirement for such an unreasonably long-term warranty does impose a veritable death sentence on the competitive structure of the automotive aftermarket. The adverse economic effect of such an unreasonably long and unnecessary warranty term on the independent automotive aftermarket will seriously impede the effectiveness of that industry to accomplish its role in the preservation and protection of the environment. The result will be a decline in air quality.

The issue is economic, not environmental. It is monopoly over free enterprise. The issue must be decided based upon principles of competition and in light of our historical national opposition to monopoly. Our industry fought hard for the 1977 amendments to the Clean Air Act. Congress believed in us and we in it. Upon enactment of the amendments, it was assumed by all that competition had been preserved and the environment fully protected by the limitation of the performance warranty after 2 years/24,000 miles to those limited parts that are placed on a vehicle for the sole or primary purpose of controlling emissions.

It is submitted that now is the time to evaluate the consequences of any type of mandated warranty to the aftermarket industry and to the consumer. There is no environmental need nor is it economically desirable to "seal the hood" of a vehicle and prevent the vehicle owner from obtaining parts and services when and where he needs them and at competitive prices determined by free marketplace conditions.

H.R.2169, introduced in the House by Representative Dannemeyer provides the opportunity for Congress to reassert its determination to protect competition as well as the environment. It provides for a realistic term for a warranty on parts that are necessary for environmental protection. The length of the warranty is sufficient to produce assurances of durability of emission systems but is not any longer than it needs to be. It provides the consumer with environmental protection along with preserving freedom of choice. ASIA strongly supports this bill and urges Senate consideration and passage of identical legislative provisions through amendment of S.2203.

This association respectfully requests that the economic issue be considered as it should be, as one totally separate and totally distinct from, any environmental issue. The independent aftermarket must not be foreclosed from providing the parts and services that only it can provide efficiently, affordably and conveniently, since to do so will result in harm to the environment.

Thank you for giving us this opportunity to express our views on this important matter.

Very truly yours,

John W. Nerlinger
President
Automotive Service Industry
Association

AUTOMOTIVE WHOLESALERS ASSOCIATION OF NEW ENGLAND
P. O. Box 238, Peterborough, N. H. 03458 603-924-6502

September 15, 1986

Senator Robert T. Stafford
133 Hart Senate Office Building
Washington, DC 20515

Dear Senator Stafford:

The **Automotive Wholesalers Association of New England, (AWANE)**, is comprised of approximately six hundred companies who market automotive parts and accessories through 2000 outlets. We should like to comment on Senate Bill S 2203.

Senate Bill S 2203 presently recommends for consideration, a 10-year, 100,000 mile warranty provision. This is intolerable and not workable -- intolerable, because the bill is recommending a monopoly which is un-American and would jeopardize thousands of businesses; unworkable, because car dealers today cannot handle their service problems. Survey your state with random phone calls. In many areas you will find that a waiting period of two weeks for a service appointment is not uncommon. Then you make your appointment; and, if your original problem happens to be "stalling out", don't be surprised if a second or third visit is in order.

In Manchester, NH, a reputable car dealer installed four mud flaps and charged 1.2 hours flat labor rate at $30.00 per hour. This equates to $36.00 labor charge for a job that doesn't take 20 minutes if the vehicle happens to be on the lift for dealer prep, etc. This ultimately breaks down to approximately $108.00 per hour. While this is no doubt an exceptional instance, the fact remains that most American car owners cannot afford to do business with car dealers.

S 2203, as presently written, will force the new-car consumer to keep going back to the car dealer -- this is monopoly fostered by the government.

Consideration should be given in S 2203 to mandate compulsory emission testing in all states. Test pipe technology is here -- pollutants can be measured. Proper maintenance of our new systems have reduced and will continue to reduce adverse contaminants.

All people do not respect what you respect, but they do respect what you INspect, when the issue involved is law. What S 2203 needs is teeth -- not provision for monopoly.

Sincerely yours,

R.T. Healy

Richard T. Healy
Executive Director,
AUTOMOTIVE WHOLESALERS ASSOCIATION
OF NEW ENGLAND, INC.

GENERAL ELECTRIC
COMPANY
[illegible] EAST LAKE ROAD, ERIE, PENNSYLVANIA [illegible]

C. J. SCHLEMMER
VICE PRESIDENT AND GENERAL MANAGER
TRANSPORTATION SYSTEMS BUSINESS [illegible]
[illegible]
[illegible]

September 25, 1986

Hon. Senator Robert T. Stafford
United States Senate
Washington, DC 20510

Senator Stafford:

We would like to recommend a revision in the New Clean Air Act legislation (S.2203) which you are now studying in your Environment and Public Works committee. As we understand the history of the legislation, when the proposed emission regulations on heavy-duty vehicles and engines were proposed, there was no intent to include standards on railway locomotives. However, as the bill is written, locomotives would probably be subject to such regulation. We urge you and your committee to exempt locomotives from the proposed emission standards.

In our opinion, the need for locomotive emission controls has never been established. The EPA has studied the issue, but could not conclude that railroad emissions were significant. Further, we believe that recent evolutionary changes in the railroad industry have decreased their emission levels.

But if there is a problem with railroad emissions, putting pollution control systems on new locomotives will not have a significant impact. The US locomotive market is still operating at recessionary levels -- US manufacturers are now at approximately 25% of their historic capacity. The simple reason is that the railroad industry is not replacing its existing fleet very quickly. For the last five years, the number of locomotives purchased annually represent on average only 2% of the total fleet size. Many experts are forecasting that those market conditions will continue into the future, especially given the current action to eliminate tax incentives for business capital investment. If emission control systems are added to new locomotives, and the price of the machines increase, the railroad's economics for locomotive replacement will become even less favorable. That would mean further market contraction. The US locomotive industry has already eliminated over 5000 jobs due to the recessionary market levels. We are worried that a further decline in the market, caused by imposed emission standards, might result in the elimination of another 5000 jobs. That would be a very steep price to pay for emission controls which will probably have little environmental impact.

Attached is a document which gives more detail about these arguments. It was written to be included in the record of your committee's hearings.

We have also sent a copy of the attached document to Curtis Moore.

If we can supply further information on this subject for you committee's work, we would be glad to do so. If appropriate, we would also be willing to appear before your committee and provide testimony on the subject of locomotive emissions.

Carl J. Schlemmer

Recommendation for Exempting Locomotives from Proposed Emission Standards

To Be Included in the Record of Hearings on New Clean Air Act (S. 2203)
Senate Committee on Environment and Public Works

Submitted by
General Electric Company
Transportation Systems Business Operation
Erie, Pennsylvania

September 25, 1986

This document was written to be put in the record for the Senate Committee on Environment and Public Health's hearings on proposed "New Clean Air Act" (S.2203) Specifically, this document applies to proposed amendments to Clean Air Act Section 202(a)(3) which would require regulation of emissions from heavy-duty vehicles and engines manufactured during or after model year 1991.

It has come to our attention, that although it was not originally intended in the legislation, railway locomotive exhaust emissions would fall under the definition of heavy-duty engines. Therefore, as a manufacturer of locomotives, we would be expected to meet the proposed emission standards.

We urge the members of the Senate Committee on Environment and Public Works to exempt new locomotives from such regulations.

The need to regulate locomotive emissions has never been justified by any type of technical study. That is true both in terms of establishing a significant level of locomotive emissions, and in terms of quantifying any type of harmful impact of locomotive emissions.

The most extensive attempt to quantify the level and impact of all railroad emissions was completed in draft form by the Environmental Protection Agency in 1985. The study was mandated by Section 404 fo the Clean Air Act Amendments of 1977. While we were asked to provide comments on the draft version of the report and did so, we have not seen a final version of the report. We have been informed by the EPA that the report has not been completed, and has not been transmitted to your committee for review. Therefore, we can currently only provide you with comments about the draft version of the EPA study.

Quoting from page 4 of the draft report: "It could not be determined from the data whether areas of concentrated railroad activity constituted a significant source of emissions for adjacent populated areas." The nature of the language in the report gave us the impression that the EPA conducted the study with the presumption that railroad emissions were indeed a problem. For example, on page 6 of the draft report, they express the unsubstantiated view that "railroads should be viewed with some concern as sources." So, even with the presumption that a problem existed, they could not establish that railroads were a significant souce of emissions even where railroad activity was concentrated.

Although the EPA did not provide evidence of any particular local areas which were affected by railroad emissions, the draft study asserted that in general: "areas which would typically experience the greatest air pollutant concentrations and longest exposure times are those in close proximity to switchyards having high levels of railroad activity." It should be noted that the railroad industry is undergoing a state of evolution which is reducing that type of activity.

First , the number of railroad emission sources is declining. The number of major railroads in the US has declined due to mergers and acquisitions. As a result, there has been a major effort on the part of the railroads to rationalize their asset base. The number of active locomotives in the US class 1 railroad fleet has declined by 23.3% from 1980 to 1985. A large number of those reductions have been in "switching locomotives" -- the type of locomotive operated in switchyards. In fact, the number of active "switching locomotives" have declined by 41% from 1980 to 1985.

Second, the amount of activity in urban areas is declining. The number of miles of railroad lines in use dropped by 12.2% between 1978 and 1983. One of the prime targets for that track rationalization has been in closing of switchyards. Mergers have allowed railroads to eliminate duplicative facilities. But further, changes in the nature of railroad traffic have made some switchyard facilities obsolete. The railroad industry has lost a significant amount of market share to truckers -- especially the type of short haul traffic within urban areas. As a result, railroads are primarily providing long haul services. Long haul bulk commodity movements now move in unit trains -- trains which stay permanently coupled and to not need to use switching yards. Long haul merchandise traffic is increasingly being handled as intermodal traffic -- "piggybacked" trailers and containers which ride on flat cars. These trains also have little need of switchyards. In effect, because a trucker will pick up trailers from intermodal terminals and provide "door-to-door" service, railroad activity in urban areas has been replaced by truck activity.

The EPA draft study gave some data on how many switchyards were next to residential areas. However, their data came from a 1976 reference. We believe that similar data for 1986 would show a sharp decline in the number of those yards. One indicator of that is actual data on the amount of fuel burned by the railroads. It can be assumed that production of air pollutants is directly proportional to the amount of fuel consumed over a period of time. The amount of fuel burned by class 1 railroads in switchyards has declined by 41% between 1978 and 1985. An similar reduction in emission levels should be expected.

So, in summary, mostly due to mergers and traffic share loss to truckers, railroads have evolved into intercity haulers with increasingly less intra-city activity. The resulting decline in the number of emission sources and the decline in switchyard activity should be causing a reduction of railroad emissions in the urban areas. Again, that is where the EPA draft study claimed that a problem would exist , if it indeed existed.

But beyond these questions about the significance of a railroad emissions problem, some serious questions should be raised about attempts to control railroad emissions via pollution control devices on new locomotives.

First, railroads are very slow to replace their fleets of existing switching locomotives with new ones. (Again, these are the units which are most likely to operate in urban areas). In fact, in 1986, US railroads did not purchase any "switching locomotives." In 1985, 29 were purchased. In 1984, 15 were purchased. The reason that these numbers are so small is that it is hard today for a railroad to economically justify the purchase of these locomotives. Even the largest US railroads are still operating "switching locomotive" fleets built in the 1950's. Assuming that emission controls would increase the cost of such "switching locomotives," the economics to replace the old locomotives would become even less favorable.

The majority of locomotives being purchased are "main-line locomotives" which primarily go into heavy-duty intercity service and will spend a minimum amount of time in urban areas. Therefore, applying emission controls to the majority of new locomotives will have little affect on urban pollution levels.

But second, the quantity of locomotives being purchased today for replacement of existing equipment is small. Compared to the total US class 1 railroad locomotive ownership of roughly 22,000 units, 471 new units were purchased in 1985. We project that only 370 will be delivered in 1986. That corresponds to a 2% replacement rate. Such a low level of new locomotive deliveries indicate that emission controls on new locomotive equipment will have little leverage over total railroad emissions.

This low replacement rate also raises the question about the effect of emission controls on the locomotive manufacturing industry. In 1986, the US locomotive industry was operating at roughly 25% of its historic capacity (approximately one-half of that came from locomotives shipped to overseas railroads). The reason for the depression in the US locomotive market is that US railroads are having trouble affording significant quantities of new locomotives. If emission controls should increase the railroads' cost of purchasing locomotives, it can be expected that market volumes will decline further. Such a reduction in the locomotive market would be economically disastrous for the locomotive industry. Low market volumes are have already eliminated over 5000 jobs in the US railroad industry. Significant declines in locomotive market activity could eliminate another 5000 jobs. That is a steep price to pay for emission control.

Overall, a railroad emissions problem has never been identified, and emission controls on new locomotives would probably have little affect on whatever emissions do exist. Therefore, we would urge you to exempt locomotives from any proposed emission regulations.

STATEMENT ON RETROFIT OF NO_x EMISSION CONTROLS FOR LARGE BOILERS

Submitted by

Stationary Source Control Committee
Manufacturers of Emission Controls Association
1707 L Street, N.W., Suite 570
Washington, D.C. 20036

September 1986

STATEMENT ON RETROFIT
OF NO_x EMISSION CONTROLS
FOR LARGE BOILERS

The Manufacturers of Emission Controls Association (MECA) is a non-profit association formed to provide technical information on exhaust emission controls for cars, trucks, and buses. A committee of MECA--called the Stationary Source Control Committee--also exists to assist regulatory decisionmakers by providing technical information on existing and developing control technologies for air pollution emitted from industrial sources.

MECA's Stationary Source Control Committee has drawn up the following statement to help inform the national debate over measures (e.g., acid rain control legislation) that would require reductions of nitrogen oxides (NO_x) from large utility and industrial boilers.

A. Introduction and Summary

Of the pollutants for which the U.S. Environmental Protection Agency (EPA) has set National Ambient Air Quality Standards (NAAQS), NO_x has traditionally been thought of as the most difficult to control from industrial sources. In the past several years, however, new boilers in Japan and Western Europe have greatly reduced NO_x emissions through the installation of advanced, cost-effective control devices. In this country, a NO_x control technology known as selective catalytic reduction (SCR) has successfully been used on new sources, and has achieved over a 90 percent reduction of NO_x emission from new boilers on a sustained basis.[1]

Now, however, pending acid rain control legislation, as well as regulatory options currently being considered, call for NO_x emission reductions from existing utility and industrial boilers via installation of retrofit controls. Such retrofit controls historically have not been required in this country because of their potential for being more technically difficult and costly than NO_x emission controls for new sources. But Japan and western Europe have in the past several years retrofitted large boilers with NO_x emission controls such as SCR that greatly reduce NO_x emissions at a cost which is likely to decrease significantly as experience with the retrofit of NO_x emission controls grows. In this country, Southern California Edison is evaluating a fullscale SCR system on an oil- and gas-fired boiler rated at 215 Mw. Over two years of tests have already been conducted on this SCR system, which was designed to achieve 90 percent NO_x removal at all load levels.[2] Based on their success abroad, SCR systems appear ready to return to our shores for use on existing sources, just as they have for new ones.

A bill (S. 2203) introduced in 1986 by Sen. Robert Stafford (R-VT), Chairman of the Environment and Public Works Committee, would require that we in fact learn from the European experience. The bill would require that by 1995 each major stationary source of NO_x emissions "attain the degree of emission reduction attained by technology demonstrated to be available for application to existing sources, in any member country of the Organization for Economic Cooperation and Development."

In order to inform the national debate over the advisability of requiring boilers to install retrofit controls for NO_x emissions, we have in the paragraphs below summarized the experience in West Germany on the points of both the technical feasibility of retrofit NO_x controls, and their cost. The Committee plans to supplement this statement when further information becomes available. All references cited below are available upon request from MECA.

B. Technical Feasibility

Because of concern over environmental damage such as de-forestation caused by NO_x emissions, West Germany adopted requirements for dramatic reductions in NO_x emissions.[3] The state government of Baden-Wurttemberg in West Germany, for example, adopted a limit of 200 mg NO_x/m^3 in January 1984 for large boilers in coal-fired power stations.[4] To control NO_x emissions from existing coal-fired power plants in Baden-Wurttemberg, government authorities considered shutdown of sources, primary measures such as combustion modifications, and secondary (post-combustion) measures such as gas cleaning. Because primary (combustion modification) measures could not alone satisfy the 200 mg NO_x/m^3 emission limitation, in all cases the government required that secondary measures be taken. The secondary measures implemented were in most cases the installation of selective catalytic reduction (SCR) technology.[5]

SCR involves the injection of ammonia into the post-combustion regions of boilers whose exhaust contains significant amounts of oxygen and then passing the gas mixture through a catalyst bed. When the mixture of ammonia and combustion products contacts the catalyst, the ammonia reacts with nitrogen oxides to form molecular nitrogen and steam, which are harmless.

Table 1 lists several large West German power plants using the SCR system to control NO_x.

Table 1. Flue-Gas Treatment Plants for NO_x Removal in West German Power Stations[6]

Utility Location	Boiler capacity and kind of fuel	FGT - vendor System	Start-up date
Neckarwerke Elektrizitätsversorgungs AG Altbach/Deizisau - Unit 5	420 MW_{el} Dry bottom Hard coal	Steinmüller SCR (high dust)	IV / 1985
VEBA Kraftwerke Ruhr AG HKW Buer	343 MW_{el} Dry bottom Hard coal	Steinmüller SCR (high dust)	IV / 1985
VEBA Kraftwerke Ruhr AG Knepper - Unit C	345 MW_{el} Wet bottom Hard coal	Uhde/Lentjes SCR (high dust)	I / 1986
Energieversorgung Oberfranken AG Arzberg - Units 5 + 7	230 MW_{el} Dry bottom Lignite	Bergbau-Forschung Uhde Simultaneous SO_2/NO_x-FGT	IV / 1986
Energie- und Wasserversorgungs-AG Nurnberg HKW-Sandreuth	3 x 106 MW_{th} Dry bottom Hard coal	Linde SCR downstream to FGD	I / 1987
Hamburgische Electricitäts-Werke AG HKW-Hafen - Unit 2	88 MW_{el} and 220 MW_{th} Dry bottom Hard coal	Steinmüller SCR downstream to FGD	I / 1987
Großkraftwerk Mannheim AG Units 3 + 4	440 MW_{th} Wet bottom Hard coal	Walther Simultaneous SO_2/NO_x-FGT	II / 1987
Energieversorgungs Schwaben AG Heilbronn - Unit 7	720 MW_{el} Dry bottom Hard coal	Energie- und Verfahrenstechnik SCR (high dust)	I / 1987
Isar-Amperwerke Zolling - Unit 5	450 MW_{el} Dry bottom Hard coal	Uhde/Lentjes SCR (high dust)	IV / 1987

West German officials are encouraged by the results so far. Any problems associated with the retrofit of SCR controls are expected to be solved at the latest in 1988 in the case of dry bottom boilers, and in 1990 in the case of wet bottom-type boilers.[7] By 1991, as shown in the following Figure 1, officials expect the primary and secondary measures implemented to reduce NO_x emissions by 80 percent over 1984 levels, which corresponds to a decrease from 50,000 tons of NO_x a year emitted in 1984, to approximately 10,000 tons a year in 1990. Figure 2 depicts the NO_x emission reductions by boiler type (wet or dry bottom) and control technique (combustion or post-combustion). These reductions are predicted despite an increasing use of coal for power production.

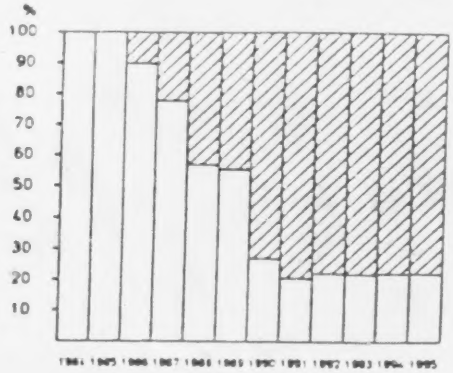
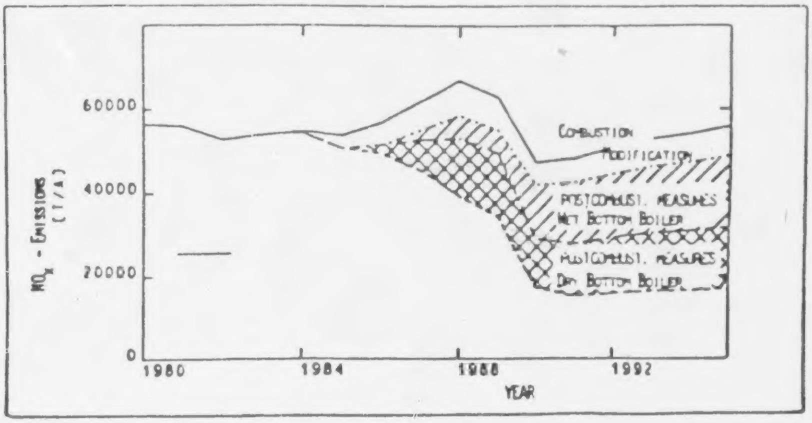


Figure 1. Reduction of NO_x Emission According to Actual Program[8]

Figure 2. Development of NO_x Emissions for De-NO_x Implementation Program[9]



Despite the great success in their program to reduce NO_x emissions from existing utility boilers, West German officials feel that further reductions are necessary from non-utility stationary sources, as well as from stationary sources in neighboring states, in order to obtain satisfactory NO_x air quality levels.[10]

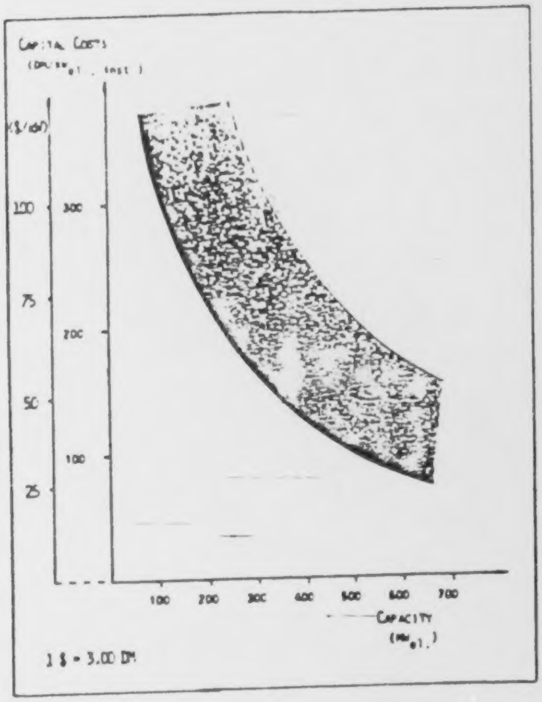
In Japan, where SCR technology has been used longer, SCR systems have become even more reliable. SCR plants for utility boilers have been operated automatically and are experiencing no appreciable difficulties.[11]

C. Cost Considerations

Questions of cost, like those regarding technical feasibility, depend greatly on the configuration of the existing plant to be retrofitted with NO_x emission control. It is also important to consider the economic benefits of employment in the equipment suppliers and construction industries that result from installation of emission control equipment. (According to one study, U.S. business investment in pollution abatement and control created $19.3 billion in sales, $2.6 billion in corporate profits, and 167,000 jobs in 1985 alone.)[12]

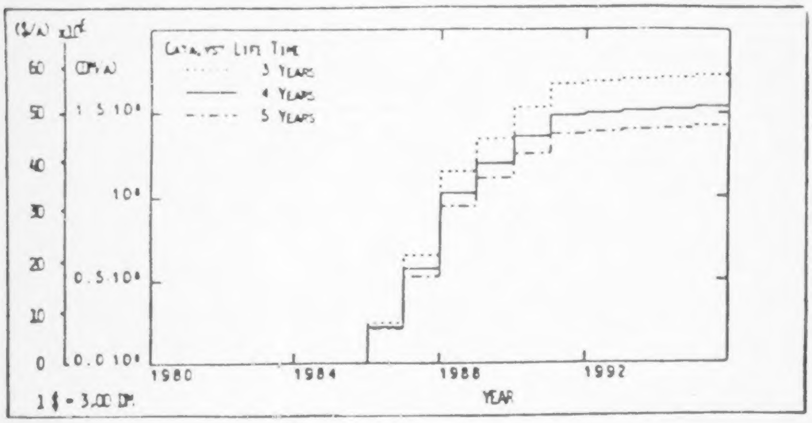
Figure 3[13] illustrates the West German experience, and represents the specific investments in deutsche marks (DM)/kW_{el} and $/$kW_{el}$ depending on the capacity installed. Special boundary conditions in Baden-Wurttemberg result in the considerable variations shown. Other sources have estimated the average specific capital investment for SCR plants, not including catalyst cost, for coal-fired power stations at about DM 5-6 million per 100 MW_{el}.[14] The operation-related costs of using an SCR system for NO_x reduction decrease as a function of hours of operations.[15]

Figure 3.
Specific Investment for De-NO_x Units in Baden-Wurttemberg



Importantly, it is striking that the specific investments shown in Figure 3 are distinctly higher than the figures for comparable installations in Japan, and are expected to decrease.[16] West German officials expect that the investments can probably be reduced, possibly to only one-third of the present level, after initial experience with the plants. They believe that a reduction in the price of catalysts alone could make a difference of 50 to 70 percent of the investment,[17] and that the price of catalysts will fall by 30 percent in the future.[18] In addition, the life-time of the catalyst--which may be extended as experience grows--has a considerable effect on the costs. Figure 4 shows the expected cost of the NO_x removal program assuming life-times of the catalyst between three and five years.

Figure 4. Total Annual Cost of NO_x Removal Program in Baden-Wurttemberg



Experience in Japan shows catalyst life-times of at least three years in coal-fired power plants, and five to seven years in oil- and gas-fired power plants.[19] SCR cost in Japan has been considerably lowered and is currently about one-third that of flue gas desulfurization.[20] Even further SCR cost reductions in Japan can be expected from possible decreases in catalyst cost.[21]

D. Summary

Officials in this country have historically considered NO_x as a difficult pollutant to control, and thus required only relatively small reductions in emissions. Several years ago, installation of selective catalytic reduction (SCR) controls on new boilers in Japan and West Germany convinced some U.S. officials to require similar controls here. These SCR systems--which originated in the United States--are now achieving over a 90 percent reduction of NO_x emissions from new boilers on a sustained basis. Based on their success abroad, these SCR systems are ready to return to our shores for existing sources, just as they have for new ones.

Similarly, Japan and West Germany have recently required large existing boilers to retrofit SCR controls. These retrofit programs have been successful, and suggest that similar programs may once again be appropriate and transferable to boilers in this country.

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see also

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5. *Id* at pp. 2-4.

6. Lange, *et al.*, *supra* note 3, at p. 9.

7. Rentz, *et al.*, *supra* note 4, at p. 5.

8. *Id* at pp, 7, 14.

9. *Id* at pp. 8, 16.

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13. Rentz, *et al.*, *supra* note 4, at pp. 5, 10.

14. Lange, *et al.*, *supra* note 3, at p. 5.

15. Scharer, B., and Haug, N., "The Cost of Flue Gas Desulphurization and Denitrification in the Federal Republic of Germany," Presented at the Fourth Economic Commission for Europe Seminar on the Control of Sulphur and Nitrogen Oxides from Stationary Sources, Graz, Austria, May 12-16, 1986, p. 11-12, 19.

16. Rentz, *et al.*, *supra* note 4, at p. 5.

17. *Id*

18. Sharer, *et al.*, *supra* note 14, at p. 7.

19. *Id* at p. 8; Lange, *et al.*, *supra* note 3, at p. 3.

20. Chou, *supra* note 11, at p. 7-9.

21. *Id*

STATEMENT

OF THE

MINING AND RECLAMATION COUNCIL OF AMERICA

BEFORE THE

ENVIRONMENT AND PUBLIC WORKS COMMITTEE

UNITED STATES SENATE

October 2, 1986

MARC is a national association of coal producers and allied industries representing over 200 companies and 32 state and regional coal associations. Through its corporate membership and affiliated associations, MARC represents over 3,000 coal operators and industry suppliers nationwide. MARC appreciates the opportunity to present its concerns regarding S.2203 and other proposed acid deposition control legislation to the Committee.

This statement summarizes MARC's position on S.2203 and other proposals mandating reductions in emissions of sulfur dioxide and oxides of nitrogen from stationary sources; highlights major concerns; and suggests a course of action for the Committee's consideration.

Acid deposition, considered by many to be one of the major environmental issues of the 1980's, is one of the more complex environmental issues ever addressed in the Congress. As such, it would be naive to think that such a complex problem is subject to a simplistic answer. It encompasses substantial scientific, environmental, economic, international, and political factors. The complexity is exacerbated by its impact on national energy policy, the potential economic impact on regions of the country, and political considerations--both domestically and with neighboring countries.

There is, however, a basic underlying theme which MARC believes should guide Congressional consideration of this issue--it is that a cure should not be prescribed before the disease is understood. This theme is reflected in the testimony of other witnesses during these hearings and is reflected in the ongoing work of the National Acid Precipitation Assessment Program. The Assessment Program is an ongoing research effort targeted to prescribing a cure. Although it has made substantial progress, significant questions remain which must be resolved prior to initiating a multi-year, multi-billion dollar program which would radically alter the economic landscape of the United States.

The current acid deposition control proposals evidence the belief that we know enough about the acid rain phenomena to require a 8-12 million ton reduction of SO_2 and a 3-4 million ton reduction of NO_x in the near future. These bills assume that these levels of reduction are both necessary and adequate to eliminate any perceived threat of acid deposition damage. MARC cannot concur with that judgment. MARC does not believe that the current state of knowledge can sustain any judgment with respect to the levels of emissions reduction needed to prevent or eliminate damage. Inadequate information exists as to the exact precursors of acid deposition, the chemical interactions and transformation processes involved, and the transport mechanisms. Having this quantitative understanding of acid deposition, to know what resources are at risk, from what, and where, and in what timeframe they are responding, is critical to establishing national program goals. MARC does believe that current research will provide the answers to these questions and that policy makers will be empowered with the knowledge to make responsible decisions within a reasonable (3-5 year) period of time.

While no amount of research will ever yield absolute answers, additional research--into the phenomenon of acid deposition, its interaction with other variables in the ecological chain, and on technologies for more cost efficient reduction of emissions from fossil fuel combustion--promises to provide a substantially enhanced information base upon which a sound policy can be formulated. The major question posed by this approach is--do we have time to develop that data base and would it be irresponsible to act in advance of such knowledge?

MARC believes the answer is yes. While MARC does not conduct scientific research on air issues and is not qualified to analyze existing research, it is reasonable to say that neither adverse health effects nor adverse effects on agriculture or forests have been documented as an impact of acid deposition.

For example, the joint envoy's report*/ details the understanding of specific forms of potential damage due to acid deposition. Their statements include:

> "The current number of acidic lakes is relatively small."
>
> "It cannot be predicted what future acidification, if any, would occur if current levels of deposition were to continue."
>
> "At this time the relationship between acid rain and forest damage in the United States is only conjectural."
>
> "Acid rain is not known to cause direct human health effects."

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*/ Joint Report of the special envoys on acid rain, Lewis, Drew and Davis, William: January 1986 pp. 7-18.

> "Without (currently unavailable) quantification, it is difficult to determine the significance of acid deposition damage to building materials."
>
> "No incidents of human health problems associated with heavy metals desolved by acid deposition have been reported in the United States."

In fact, some recent scientific research has begun to cast serious doubt upon the position held by some groups, which have steadfastly attributed forest decline to acid deposition. Research, conducted by the University of Vermont, has discovered the presence of ghost moths (nepialus gracilis) in high elevation forests, which have been documented as having destroyed 5% of small saplings. These moths, previously undetected, have now been found on White Face Mountain in New York's Adirondacks and Mount Moosilouke in New Hampshire's White Mountains, both sites of extensive acid deposition studies, and in 18 of 20 sites monitored in the Green Mountains. Hubert Vogelman, Vermont professor of botany and the leading authority on acid deposition's effects on vegetation at Camels Hump, agrees that ghost moths complicate the issue of forest decline. Vogelman recently said that "there is no question that they (ghost moths) are at this time an ecological factor" and that "this may upset people that are looking for simple answers like acid rain."

Government records show that virtually all the country's more than 3,000 counties meet federal SO_2 standards, and that SO_2 levels are within safe limits for health. The Council on Environmental Quality, in its 15th Annual Report (1986), stated that "it is clear that the SO_2 problem, from the standpoint of public health impacts has essentially been eliminated in the nation." The Clean Air Act's main goal - protecting people's health - is being achieved and the Act's provisions continue to work with increasing effectiveness and stringency.

It is also a fact that since implementation of the 1970 Clean Air Act, SO_2 emissions from stationary sources have continued to decrease. One cannot deny that substantial overall SO_2 emission reductions occurred during the decade of the 1970's. Recent EPA and industry evidence show that SO_2 emissions from coal fired power plants have continued to decline significantly despite substantial increass in coal use during the past decade. Between 1980 and 1985 the nation experienced a growth in utility coal consumption of more than 23% or 125 million tons. During this same time span, notwithstanding the significant increases in coal consumption, emissions of SO_2 from coal fired utility power plants actually declined by nearly 1/2 million tons, or 3%. This downward trend is predicted to continue as a result of older plants being retired and new sources being brought on line. Moreover, between 1973 and 1983, industrial emissions declined by 46%. As the requirements of the 1977 Clean Air Act Amendments take full effect, such as the revised NSPS and PSD requirements, further emission reduction will result.

It is not disputed that high acidity levels exist in surface waters of sensitive regions of the United States and Canada and that these areas receive acidic deposition. What is not known is whether a reduction in the level of acid deposition in these areas will result in any corresponding change in the acidity level of the effected waters or in the acidity and sulfate levels in precipitation. As reflected in the work of the National Academy of Science on acid deposition, the relative contribution of local and distant sources of SO_2 and NO_x emissions to the pH level of rainfall and dry sulfate deposition and whether the deposition directly impacts the acidity level of effected waters is not quantitatively known. However, the recent National Research Council report suggests that where surface water quality is concerned, local rather than distant sources seem to have been dominant. S.2203 and S.2813 clearly ignore these results.

The approaches taken by the new bills and the resulting reduction in aggregate SO_2 emissions are very costly - estimates range from $34 billion to several hundred billion over the next 20 years - yet may likely prove to have little effect on the localized and limited instances of ecological imbalance which are indicated to be a primary cause of acid deposition.

MARC believes, based upon existing knowledge and projected trends of emissions, that we do have time to develop a better emperical base prior to committing to an additional control program and that we do have time to develop more efficient emission reduction technologies.

For these reasons, MARC is opposed to enactment of legislation including S.2203 and S.2813, which would mandate additional multiyear reductions of SO_2 and NO_x emissions from stationary sources. In this regard, MARC is specifically opposed to federally mandated technology or regulatory requirements on existing sources to reduce emissions from stationary sources. MARC believes that the private sector, with its inherent competitive forces, is best equipped to determine the most cost efficient and workable compliance methods to meet new emission standards should they be established by the Congress.

Recognizing the specific problem of acidified waters in sensitive regions of our country and the likely contribution of SO_2 emissions, MARC supports efforts to expeditiously resolve the scientific uncertainties in our knowledge of the acid deposition phenomenon and to immediately address the problems of acidification of waters in sensitive regions through mitigation. A pilot program to effect this has been approved by the House of Representatives in the Clean Water Act Amendments legislation currently in conference with the Senate and an ongoing voluntary private sector program, "Living Lakes," is going forward with a mitigation program in several states.

As reflected above, MARC believes that given existing scientific knowledge, initiation of an additional reduction program at this time is neither justified nor supportable. Under S.2203 or S.2813, billions of dollars will be expended which may result in no improvement to the problem hoped to be addressed. A more progressive and consistent course of action is to address the problem of acidified waters through mitigation (such as lake liming) and to aggressively move forward with the recently implemented Clean Coal Demonstration Program and basic research programs which promise to provide more cost effective methods to reduce SO_2 and NO_x emissions from stationary sources.

As you well know, there have been three recent federal initiatives to expand or add programs to stimulate technology for clean coal innovation.

(1) The President called for increased R&D on the clean use of coal in January 1984 and committed $600 million for FY'85-87. This core federal program brings new technology options from concepts to being ready for use as demonstrations and in commercial application.

(2) The Clean Coal Technology Demonstration Program enacted by Congress last December is designed to demonstrate new options. The Congress has appropriated $400 million thus far - to be matched by industry - and a number of promising projects have been accepted by DOE.

(3) The U.S. and Canada acid rain envoy's report proposes an expanded innovative technologies demonstration program and includes other recommendations to assist successful commercial use of successful technology options.

The critical feature of the technology development as it relates to future emissions control programs is the timeframe for commercial acceptance. A successful demonstration, which could take several years, initiates the commercialization process. Such a timeframe is not available under control scenarios set forth in S.2203 or S.2813 which must be planned and approved by 1990 or very shortly thereafter. If new requirements precipitate immediate choices of technology, the only apparent option would be the application of costly and inefficient control mechanisms as scrubbers. New, more efficient methods are on the horizon if time is allowed for their demonstration and funding is not diverted from their development. Moreover, they are more likely to be used when there is a reasonable lead time between planning and implementation in new facilities or as retrofit applications.

MARC is concerned that the pending proposal will effectively eliminate halt the progress being made in the development of clean coal technologies by forcing limited capital resources to immediate compliance methodologies. MARC believes this will be detrimental to the long term overall air quality and energy policy goals of the nation.

Our national energy policy, evolved through the decade of the '70s, is premised upon utilization of domestic resources, as coal, for energy production. To meet the goal MARC suggests that increased emphasis must be placed on developing pre-combustion, combustion, and post-combustion technologies through the commercial demonstration stage which facilitate coal use for power generation with reduced emissions. Through development and utilization of more advanced technologies for the more efficient and environmentally inert use of coal in conjunction with the utilization of domestic coal resources that will result in reduced emissions, U.S. coal (as opposed to foreign coal which will be imported in substantially increased amounts should S.2203 or S.2813 become law) can continue to provide the least cost energy for America's homes and factories for hundreds of years. This course of action will work to simultaneously pursue and achieve both our nation's environmental and energy policies.

STATEMENT
ON BEHALF OF
NATIONAL ASSOCIATION OF MANUFACTURERS
BEFORE THE
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
UNITED STATES SENATE
OCTOBER 2, 1986
ON S. 2203, THE "NEW CLEAN AIR ACT"

INTRODUCTION

This statement is submitted on behalf of the National Association of Manufacturers, a voluntary association of enterprises engaged in manufacturing in the United States. We appreciate the opportunity to have our comments included in the record of the Committee's hearings on S. 2203, the proposed "New Clean Air Act," because we have grave concerns about its impacts and implications, both economic and legislative.

The bill contains 11 pages of amendments to the Clean Air Act, leaving untouched the great body of the provisions of the Act; yet, it is entitled the "New Clean Air Act." This could be a source of great confusion.

Stationary Sources of Emissions of Sulfur or Oxides of Nitrogent

However, in one sense, it certainly is "new." It abandons any role for the States and directly imposes emission controls on existing stationary sources regardless of the quality of the ambient air in the particular State. The first amendment in the bill has an Alice in Wonderland quality about it, reminiscent of the philosophy that "a word means what I want it to mean." Lo and behold, when a facility arrives at its 35th birthday, it becomes a "new source"! Surely, there is some less tortuous way to achieve what is intended. There is an obvious lack of equity in changing the rules for stationary sources after years of an established regulatory program have gone by. The lack of equity seems more pronounced when the rules are changed for stationary sources all over the United States without consideration of individual circumstances, and especially when the change is accomplished by mislabeling. Over the years, investment decisions have been made; employment decisions have been made by employers; and job decisions have been made by individuals. The introduction of new economic considerations could result in severe economic dislocations. It should be noted that this provision covers stationary sources without limitation to electric generating facilities and without limitation in size. The repercussions throughout the economy would be widespread and are incalculable.

We do need a new comprehensive Clean Air Act that deals with such problems as increments in Prevention of Significant Deterioration areas and offsets in nonattainment areas, but this bill does not accomplish that task. In all fairness it should not be called a "New Clean Air Act." This bill merely interjects a heavy Federal hand into a Federal-State program. It is completely contrary to the philosophy of "get government off our backs" which is the basis of the movement for regulatory reform.

Fossil-Fuel-Burning Electric Generating Facilities

The second amendment in the bill would limit the total remaining hours of operation for each fossil-fuel-burning electric generating facility which is a major stationary source of emissions of sulfur dioxide. The general rule would be a total of no more than 3,000 hours, notwithstanding the remaining useful life of such source. We do not know the scientific source of the number 3,000 or what specific benefit this particular limitation would bestow. On the face of it, this appears to be a taking without compensation of the remaining useful life of a capital investment.

Also, in the case of any such facility that attains an emission rate of 1.5 pounds of sulfur dioxide per million BTU's of heat input or less, such source may operate for a total of no more than 10,000 hours. Once again, we do not know the scientific basis for the number 10,000 or the compelling reason for the facility to shut down after 10,000 hours of operation. These are arbitrary numbers and there is no provision for variances from them in cases of demonstrated hardship or difficulties.

Finally, any such source that attains an emission rate of 0.7 pounds of sulfur dioxide per million BTU's of heat input or less shall have no limit on hours of operation "in hours of peak demand under this subsection." Does that mean that these facilities will be limited to operating only in hours of peak demand? What about a source that attains an emission rate of 0.8 pounds per million BTU's of heat input? Would it have to shut down after 10,000 hours? We question the desirability and feasibility of trying to regulate by forcing the shutdown of productive facilities.

Major Stationary Sources of Emissions of Oxides of Nitrogen

The third amendment in the bill would require that, not later than January 1, 1995, each major stationary source of emissions of oxides of nitrogen shall attain the degree of emission reduction attained by technology demonstrated to be available for application to existing sources in any member country of the Organisation for Economic Cooperation and Development.

We strongly object to the use of extraterritorial standards in United States regulatory programs. Not only is this provision an extremely bad precedent, but it will lead to major administrative problems and to considerable litigation. It is difficult enough to reach a determination of what is "best available technology" in the United States. Major controversies have raged around this issue. We presume the provision means the highest degree of emission reduction. Imagine the potential arguments over which of the 24 member nations of the OECD has the highest degree of emission reduction attained by technology demonstrated to be available for application to existing sources.

Some countries subsidize their industries' pollution control costs. In terms of international competitiveness, grave inequities could arise if United States companies were forced to purchase and install and operate foreign technology. We assume such foreign technology would be protected through foreign patents, United States patents or international agreements. Our U.S. balance of payments problems is bad enough as it is without forcing U.S. companies to pay license fees to foreign companies.

A lesser but substantial point is that this provision would require the EPA Administrator to maintain surveillance over the industries of 24 countries and to publish, every five years, guidance documents identifying what degree of emission reduction has been deonstrated for various categories of sources. We doubt that environmental protection efforts in this country need or will benefit from this degree of internationalization of the program.

Oil Shale Production and Processing Facilities, Synthetic Fuel Production Facilities, and Other Categories of Major Energy-Production Sources

The fourth amendment contained in the bill provides that, not later than January 1, 1988, the EPA Administrator shall promulgate standards of performance for oil shale production and processing facilities, synthetic fuel production facilities, and other categories of major energy-production sources which shall apply to any such facility on which construction or modification is commenced after January 1, 1986.

The retroactivity of this provision is unfortunate. It is an effort to apply new source performance standards to "old" facilities. Most likely this amendment would cause some projects to be suspended or cancelled. The economic feasibility of any project can not be calculated without knowing what standards will apply to its operation. Therefore, a provision like this could bring a halt to many planning and development activities. We are also disturbed by the sweeping phrase "and other categories of major energy-production sources." The first two categories mentioned in the provision are really fuel-production soruces not energy-production sources. It is impossible to fathom the intended sweep of the quoted phrase; it might be interpreted to cover all sort of energy generating facilities and fuel production facilities.

Conclusion

We have discussed the bill's provisions which have the most direct deleterious impact on manufacturing operations. The bill would impose additional billions of dollars of production costs on the U.S. economy to achieve objectives which are not explicitly stated in the bill. S. 2203 states that it is a bill to establish a program to reduce acid deposition, but it is really a bill to require retroactive emission controls on all plants, both manufacturing and electric generating, whether or not they contribute in any way to acid deposition. How much reduction in acid deposition is being aimed at by the bill is not stated, nor does it state how it is planned to measure such reduction. The costs to U.S. manufacturing industry will be enormous, both through direct costs of retroactive fitting of manufacturing plants but through increased costs of electric energy. Energy is the lifeblood of industry, and industry consumes 40 percent of all electricity generated in this country. It has been estimated that S. 2203 could cost three and a half times the cost of the House bill and as much as $110 billion in all. U.S. industry would pay the lion's share of this cost because it is the largest single consumer of electricity in the country. There would be huge capital costs of retrofitting and fuel conversions. Also, employment would be impacted as some plants and coal mines might shut down.

The bill purports to establish a program of acid deposition control; yet, it does not identify a unit of acid deposition nor what percentage of reduction of these units is intended. Perhaps the unit intended is kilograms per hectare, but the bill gives no clue. It calls for massive emission reductions with no target and no way to measure success or failure.

The bill ignores economics and competitiveness. The words "cost" and "cost effective" are never mentioned. It is basic in air pollution control that it is much more costly to retrofit existing plants. In many instances, extensive parts of the existing plant must be ripped out. In many instances, lack of available land makes it extremely costly or even impossible to retrofit. Yet this bill could require a massive national program of retrofitting. This could be catastrophic for America's productive capacity. Pollution control equipment is extremely costly to install and to operate. Electrostatic precipitators and flue gas desulfurization units cost millions of dollars per installation.

We believe it would be the better part of wisdom to lay aside these piecemeal amendments to the Clean Air Act and to focus on the development of a comprehensive new Clean Air Act that could be introduced in the 100th Congress.

We appreciate the opportunity to present our views.

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June 25, 1986

The Honorable Robert T. Stafford
Chairman
Committee on Environment and Public Works
United States Senate
SD-410
Dirksen Senate Office Building
Washington, D.C. 20510

Dear Mr. Chairman:

I represent and am writing on behalf of the Specialty Equipment Market Association (SEMA) which is an industry association representing the manufacturers and distributors of specialty automotive equipment for motor vehicles. We have reviewed the provisions of S.2203, the "New Clean Air Act" and have a few comments which we believe are relevant to its consideration. Our comments will relate to the proposed emission standards, the 10 year/100,000 mile warranty and the I/M emission component inspection.

EMISSION STANDARDS

The current emission standards, at least for passenger vehicles, have provided for great reductions in vehicular emissions. Any attempt to further reduce these emissions would not be cost effective for the results to be gained. The current emissions control technology is providing for emission values significantly lower than the standards with good fuel economy and, in most cases, excellent driveability. Any attempt to further reduce emissions could result in a degradation of both fuel economy and driveability which would only lead to more tampering which is already at an alarming rate. And, one tampered vehicle is capable of emitting emission levels equivalent of 50 or more vehicles operating at their certification values.

We believe that for the sake of clean air, the monies that would be spent by the manufacturers to advance their technology to meet the proposed standards of S.2203 would be better spent assuring that the vehicles produced today would maintain their certification levels throughout the useful life of the vehicle. Studies conducted by the California Air Resources Board (ARB) have revealed some alarming facts and numbers. They have found statistically significant samples of vehicles in non-compliance at as low as 15,000 miles even after excluding tampered or improperly maintained vehicles. Twenty-two percent of passenger cars under 50,000 miles exceed the applicable emission standards because of defective or deteriorated emission components. In a general in-use vehicle surveillance study where each vehicle was tested "as received" to establish compliance with its new vehicle certification standard, sixty-three percent of the vehicles exceeded the standards by more than fifteen percent, eleven percent exceeded the standards within fifteen percent while the remaining twenty-six percent passed the standard. This does not identify what percentage may have exceeded their certification values. Following repairs and/or adjustments on non-complying vehicles, sixty percent of the fleet still failed to meet the applicable standards. All of these studies only verify the inability of the vehicle manufacturer to provide durable control systems.

It is clear that the problem is not that the emission standards are not strict enough, the problem is that the emission control systems do not have sufficient durability to maintain the current standards. Increasing the stringency of the standards will cause the expenditure of funds for the wrong solution and will increase unnecessarily the burden on aftermarket manufacturers of automotive parts to comply with emission regulations.

10 YEAR, 100,000 MILE WARRANTY

While it is clear that durability is the issue, it has been shown that warranty does not induce manufacturers to build in durability. Although it has been argued that the vehicle manufacturers need to be prodded to build durably clean cars, there is no evidence that warranty itself forces manufacturers to build cars to satisfy clean air demands. Former ARB Chairwoman Mary Nichols stated this conclusion at ARB hearings in May of 1981 when she rejected a staff proposal to extend the warranty period to 7-years, 75,000 miles, arguing that "the warranty has not been the way to get more new car durability," nor, she added, is "extending it going to solve the problem."

Vehicle durability is created at the design and production stages. This is evident by the EPA requirement that prototype vehicles undergo 50,000 mile durability testing prior to going into production. And, although production vehicles are subjected to random assembly line tests, in use these vehicles still fail to comply at very low mileage, as previously discussed.

Warranty has been little more than a marketing tool for the manufacturer with little or no concern over any potential liability the warranty might pose. This was evident after the ARB reduced the 5-year/50,000 mile warranty on certain tune-up parts to a period of 2-year/24,000 miles. All but one manufacturer said they would continue to offer a 5-year/50,000 mile warranty. This decision was likely based on the conclusion that there is a limited degree of exposure to a manufacturer from warranty claims. After all, the decision between valid and invalid warranty claims is often a judgement call. A natural bias favoring the manufacturer exists when unchallenged decisions rest in the hands of the vehicle manufacturers, through their dealers. A powerful financial incentive exists to deny a warranty claim since the consumer has paid for the warranty at the time of vehicle purchase and relatively few warranty repairs are ever undertaken. The Automobile Club of Southern California conducted a survey which showed that less than one percent of the cars tested in the I/M program received free repairs under warranty, while twenty-two percent actually qualified for such repairs. This evidence is certainly contrary to those that would argue that a warranty is a free benefit to the consumer and not a windfall to the manufacturer. In fact, in March of 1977, the chief of the Antitrust Division of the U.S. Justice Department called warranty nothing more than a "service contract, the direct costs of which is included in the initial vehicle price."

We would argue that the warranty offers no inducement to greater durability and provides little air quality benefits. While there is little benefit to the extended warranty, it would likely have an adverse effect on the automotive aftermarket. It would allow the manufacturers to continue their monopoly of parts and service for 10-years or 100,000 miles instead of 5-years or 50,000 miles.

The practical effect is to send business to new vehicle dealers which they have been unable to obtain through competition. A 1981 report prepared by Booz-Allen & Hamilton, Inc. found that consumers were significantly less satisfied with dealer repair work than with work done by any other type of repair facility. The same study showed that, in a free market place, dealers suffered from the lowest rate of repeat business. The warranty, a proven traffic builder, is a tool to help counteract this free market pattern. If this were not true, the dealers and manufacturers would be lined up beside the aftermarket parts and service industry complaining to the Congress as to the severe burden warranty has placed on them.

I/M EMISSION COMPONENT INSPECTION

The aftermarket parts and service industry agrees on the necessity for inspection and maintenance programs. It is the only means to address in-use vehicle emissions and to trigger emission warranties. Although I/M programs are said to be an effective means of addressing in-use vehicle emission, the EPA has suggested that ozone and oxides of nitrogen are on the increase. Various reasons have been given for this: the programs are poorly managed, there is not sufficient enforcement of the program, emission cut-points are not low enough, repair cost limits are too low to allow for sufficient repair, and there are high levels of tampering, to name a few.

Ongoing EPA motor vehicle tampering surveys indicate alarming rates of tampering. The overall tampering rate for 1984 was twenty-six percent when the data is weighted for the proportion of the national vehicle fleet covered by I/M-only programs and I/M plus anti-tampering programs (ATP). The tampering rate for areas without an I/M program was thirty-one percent while the rates for I/M-only and I/M plus ATP areas were seventeen percent and eleven percent respectively. In light of this data, there is obviously a clear need for not only I/M programs but, I/M plus ATP programs. However, we would caution against the implementation of an anti-tampering program which addresses components other than those which have as their primary purpose the control of emission. The components for inspection in this case should be limited to the catalytic converter, fuel inlet restrictor, air injection systems, exhaust gas recirculation valve, positive crankcase ventilation valve and evaporative emission controls. These are the parts which have been recommended for inspection by the EPA.

To extend the inspection beyond those parts principally related to emissions control is to invite a level of complexity which could well destroy the potential effectiveness of the program before it begins. In California, for example, the field inspectors have been required to look at all engine parts to determine whether they are original equipment or aftermarket; if aftermarket, the part must be checked against catalogs or ARB lists to ensure it is an approved part. In placing such an onerous, time consuming requirement on the service industry, some of the more critical emission control devices are being overlooked. For example, in an evaluation study of the California I/M program, Radian Corporation reported that field inspectors only identified the following percentages of tampering:

*Catalytic Converters	- 43%
*Air Injection Systems	- 59%
*Evaporative Controls	- 29%
*Fuel Inlet Restrictor	- 13%
*PCV	- 24%
*EGR	- 22%

We believe that if field inspectors were required to identify and inspect only those parts which are directly related to emission control, the program would be more effective as it relates to ambient air quality benefits.

EMISSION RECALL

As I have stated, it seems clear that the most effective means of insuring improvements in air quality is to improve upon the durability of the emission control systems. Further, we believe that the most effective means of encouraging the development of such durability is to enforce an effective product recall program. The huge potential liability costs threatened by a large recall will provide a substantial economic incentive to produce reliable and durable systems. While the cost to vehicle manufacturers of warranty repairs carries a far smaller price tag because of limited car by car exposure, the threat of a multi-model engine family recall imposes a far heavier burden; a burden not subject to the judgement calls of new vehicle dealers. Recall provides for a greater impact on national ambient air quality. Where warranty may provide minimal gains in air quality over a period of time for those regions with I/M programs, a recall triggered in one I/M location provides immediate air quality benefits across the nation.

Additionally, conducting recalls does not impose an anti-competitive impact on the aftermarket parts and service industry as does warranty by an unfair binding of the motorist to the vehicle dealer. Unlike warranty, recall provides a true consumer benefit. When a recall notice is received, the consumer knows exactly what must be repaired or replaced. He is not subjected to unwanted repairs. To ensure the consumer fulfills his obligation to have the required repairs completed under the emissions recall, a list of such recalls could be provided to state DMV's for flagging and enforcement at the time of re-registration of the vehicle.

We would recommend that the Committee direct its energy to increasing emission control durability, monitored by an effective recall program.

CONCLUSION

SEMA would support a position for the following:

- *No adjustments to light duty vehicle emission standards;
- *2-year, 24,000 mile emissions warranty;
- *Anti-tampering inspections of primary emission control devices; and
- *Extended recall.

We appreciate having the opportunity to make our views available to the Committee and would be pleased to provide whatever additional information is in our possession which might be of use to the Committee as it reviews this important legislation.

Sincerely,

Robert C. Burch
Vice President
Technical/Legislative Affairs

RCB/aq

Testimony of

ALEXANDRA ALLEN CARR

STAFF ATTORNEY

UNITED STATES PUBLIC INTEREST RESEARCH GROUP

in support of
S. 2203, THE NEW CLEAN AIR ACT

BEFORE THE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
UNITED STATES SENATE

Washington, D.C.

October 15, 1986

The United States Public Interest Research Group appreciates the opportunity to submit written testimony on legislation addressing acid rain.

In this testimony, we wish to make four essential points:

1.) The public health threats posed by acid rain and its precursor pollutants are substantial, and include not only respiratory damage, but contamination of drinking water supplies.

2.) The testimony in these hearings that there is no need to set more stringent standards for electric utilities and other major stationary sources cannot be substantiated, and should not be the basis for environmental policy.

3.) Similiarly, testimony that the mobile source emission standards in S.2203 are unachievable reflects a lack of will, rather than a lack of technological resources.

4.) In order to limit damage to our environment and public health, we must not only amend the Clean Air Act to control acid rain, but also revitalize exisiting parts of our nation's air pollution control program.

Public Health Damage

The public health effects of acid rain and its precursor pollutants can be separated into direct and indirect effects. Direct effects include respiratory illnesses and aggravation of illnesses caused by sulfur and nitrogen oxides.

Studies have shown that sulfur oxides can obstruct breathing, and can cause and aggravate bronchitis and emphysema. Certain members of the population are particularly sensitive to lung disease, and suffer these effects at lower pollution levels than the general population. At greatest risk are children under ten years of age, adults over 65, and asthmatics, comprising 14%, 12%, and 3% of the U.S. population respectively. A 1984 OTA study estimated that 50,000 premature deaths may be attributed annually to airborne sulfates and particulates. (1)

Several witnesses at these hearings have outlined the causation and incidence of damage to the human respiratory system from sulfur and nitrogen oxides, with a particularly comprehensive analysis having been provided by Dr. Thomas Godar of the American Lung Association. We wish to underscore the importance of those findings, and to address some of the indirect threats to public health posed by sulfur and nitrogen oxide emissions.

Indirect public health effects of acid rain are brought about by the leaching of toxic metals from soils and pipes, and the resulting contamination of drinking water supplies. Lead and copper pipes are commonly used for water distribution, and mercury and aluminum are readily leached from soils by acid rain.

Where households rely on private wells drawing acidified groundwater, or are served by municipal systems which do not adequately remove toxic metals, the occurence of contamination has already been documented. In a study of drinking water drawn from acidified wells in the Adirondacks, public health officials found lead levels that were four times higher than the federal standards for drinking water. (2) New York state officials also reported at least two cases of elevated lead levels in the blood of children whose water supplies had pH's from 4.2 to 5.0 and which were served through lead pipes. Mercury concentrations above public health standards have been found in fish from acidified lakes in Minnesota, Wisconsin, and New York. (3)

Health risks posed by elevated body burdens of lead and other toxic metals are unacceptably high. Effects of lead toxicity include anemia, cirrhosis of the liver, and brain damage. Mercury poisoning causes neurological disorders, some of which have been observed in communities near acidified lakes where fish is a major food source. (4)

Because many of the affected water supplies are not treated for toxic metals, halting the contamination that has already occured, and preventing further contamination, can only be done by cutting emissions of pollutants that cause acid rain.

Further Utility and Industry Controls Needed

In his testimony before this Committee, Mr. Carl Bagge, President of the National Coal Association, stated that, "Any thought that the Clean Air Act is losing its efficacy with respect to reducing SO2 emissions should be laid aside." He testified that from 1980 to 1985, SO2 emissions from coal-fired power plants declined by 3%, while utilities' coal consumption increased by 23%.

We would agree that a drop in emissions over a period of increased coal consumption is a noteworthy demonstration of the importance of the environmental regulation and industry cooperation. However, the benchmark in this debate is environmental quality. Hence, the appropriate question is not simply whether emissions are falling, but whether they are falling enough to protect human health and the environment.

The National Academy of Sciences has called for a 50% reduction in acid deposition from 1980 levels to protect threatened resources, and has concluded that reductions in emissions would lead to directly proportional region-wide reductions in acid deposition. The 3% decline noted by Mr. Bagge represents a cut in SO2 emissions of approximately half a million tons over five years. S. 2203 would require annual SO2 emissions reductions of roughly 12 million tons. Clearly, emission reductions in the 3% range cannot begin to solve the acid rain problem.

Projections of future emissions have been developed by research bodies including the utilities' Edison Electric Institute, and the EPA. An analysis of five such reports by the Office of Technology Assessment showed that every report projected increases in SO2 and NOx emissions from now through 2010. For the period 1985-2010, projected increases of SO2 emissions ranged from 22% to 24%. For NOx, projected increases over this time period were approximately 47%.

These data strongly refute the idea that inaction is an acceptable option. Requirements under the current Clean Air Act will not result in the sizable SO2 and NOx reductions which are necessary to reduce acid rain. S.2203, The New Clean Air Act, would help to close these gaps.

Tighter Vehicle Standards: Necessary and Achievable

Motor vehicle manufacturers have asserted that tighter emissions standards are unnecessary and unachievable. Both of these conclusions are inconsistent with existing scientific data, and with the demonstrated success of technology-forcing measures under the Clean Air Act.

Mr. Thomas Hanna, President of the Motor Vehicle Manufacturers Association of the United States, concluded on page six of his testimony that:

> There is considerable scientific uncertainty about the contribution of motor vehicle emissions to acid rain formation and, indeed, about the environmental effects of acid rain at all. Under these circumstances, it would be premature to impose very stringent and costly additional controls.

This classic statement of the 'wait and see' approach fails to note that the most significant uncertainties about the environmental effects of acid rain are how much worse they will get, and how soon they will get there.

As for uncertainties about the contribution of motor vehicle emissions to acid rain, there is at least enough certainty for Mr. Hanna to state on page two of his testimony that highway vehicles may be linked to 10.7% of total acid deposition in the Northeast. His written testimony does not include such an estimate for the West where motor vehicles' contribution is considerably higher, particularly in urban areas.

Mr. Micheal Walsh, an independent consultant on motor vehicle air pollution controls, testified that in urban areas usually between 30% and 50% of the nitrogen oxides are emitted by motor vehicles. (p.3 Walsh) Several witnesses expressed the scientific community's rejection of the idea that because the contribution of NOx to acid rain is not as large as that of SO2, more stringent NOx controls are unnecessary. In view of the role of NOx as a precursor to ozone, the case for tightened NOx standards is especially compelling.

The motor vehicle industry's claims that the emission standards in S.2203 are not feasible should be treated as they have been before - i.e. rejected, so that the industry can get on with the job of meeting them. There is agreement that 25% of the 1986 fleet is certified to meet S.2203's standards for at least one of the controlled pollutants; and that 3% of 1986 passenger cars are certified to meet S.2203's standards for all of the pollutants.

However, industry representatives assert that the rest of the 1990 and 1991 fleets cannot be brought up to the standards of the leading 3% at certification or in use. They maintain that efforts to control one pollutant inevitably result in higher emissions of another pollutant. However, Mr. Walsh's data show that in 1986, 150 of 576 engine families were certified below .25 grams per vehicle mile for both HC and NOx. (Walsh, p.10) Walsh characterized claims of infeasibility as "particularly suspect" in view of the fact that many vehicles already achieve levels required by S.2203. (Walsh, p.9)

On several occasions since the adoption of the Clean Air Act, auto industry representatives have argued that emissions limitations were not feasible, yet they have been met and surpassed. Reductions in automobile emissions stand as one of the most important achievements in our nation's air pollution control effort. Today, when further reductions are needed, we should adhere to the concept of basing standards on levels achieved by the technological leaders.

Only by setting stringent standards with firm deadlines will the Clean Air Act's technology-forcing potential be realized.

Reaffirming our Commitment to Clean Air

Finally, we wish to emphasize that the delays in Congress and at the EPA have not been limited to acid rain controls. Many of the important goals under the current Clean Air Act have not been met, including protection against toxic air pollutants, prevention of significant deterioration of clean air, achievement of health standards in urban areas, and protection of visibility.

The lack of regulation of toxic air pollutants presents a particularly egregious example of the failure to implement a control program to meet a know hazard to human health. Dozens of toxic air pollutants have been identified in areas where millions of Americans live, yet the EPA has set standards for only five toxic air pollutants from stationary sources under Section 112 of the Act, and has officially recognized, or listed, only three others. Thousands of cases of cancer and other serious illnesses have been linked to unregulated toxic air pollutants - illnesses that could be prevented by an effective control program.

Mr. Chairman, this Committee's action on S.2203 is an important break in the long delay on acid rain controls, and one which we hope signals a commitment to end the delays in other critical areas of our country's air pollution cleanup program as well. We look forward to working with this Committee to curb these threats to our public health and natural resources.

References

(1) Acid Rain and Transported Air Pollutants: Implications for Public Policy (Washington, D.C.: U.S. Congress, Office of Technology Assessment, OTA-O-204, June 1984).

(2) Gould, Roy. 1985. Going Sour: Science and Politics of Acid Rain. Boston, Mass.: Birkhauser Boston.

(3) Acid Rain and Transported Air Pollutants (OTA, 1984).

(4) Acid Rain and Related Air Pollutant Damage: A National and International Call for Action (Boston, Mass.: Massachusetts Dept. of Environmental Quality, August, 1984).